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Revision 0

UC-630, 721

200 West Ash Pit Demolition Site Closure Plan

Date Published
November 1992

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United States
Department of Energy
P.O. Box 550
Richland, Washington 99352

Approved for Public Release

STATE ENVIRONMENTAL POLICY ACT

ENVIRONMENTAL CHECKLIST FORMS

FOR

THE 200 WEST ASH PIT DEMOLITION SITE CLOSURE PLAN

REVISION 0

November 1992

WASHINGTON ADMINISTRATIVE CODE
ENVIRONMENTAL CHECKLIST FORMS
[WAC 197-11-960]

A. BACKGROUND

1. Name of proposed project, if applicable:

Closure of the 200 West Ash Pit Demolition Site (Ash Pit Demolition Site).

Within this checklist, "Ash Pit Demolition Site" refers to the 200 West Ash Pit Demolition Site, and "ash pit" refers to the entire, disturbed borrow and ash pit.

2. Name of applicants:

U.S. Department of Energy, Richland Field Office (DOE-RL); and Westinghouse Hanford Company (Westinghouse Hanford Company).

3. Address and phone number of applicants and contact persons:

U.S. Department of Energy
Richland Field Office
P.O. Box 550
Richland, Washington 99352

Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

Contact Persons:

J. D. Bauer, Acting Program Manager
Office of Environmental Assurance, Permits, and Policy
(509) 376-5441

R. E. Lerch, Deputy Director
Restoration and Remediation
(509) 376-5556

4. Date checklist prepared:

November 1992

5. Agency requesting the checklist:

Washington State
Department of Ecology
P.O. Box 47600
Olympia, Washington 98504-7600

6. Proposed timing or schedule: (including phasing, if applicable):

Closure of the Ash Pit Demolition Site would begin and would be completed within 180 days after approval of the closure plan following notification by the Washington State Department of Ecology (Ecology).

7. Do you have any plans for future additions, expansion, or further activity related to or connected with this proposal? If yes, explain.

There are no plans for future additions, expansions, or use of the Ash Pit Demolition Site. However, the entire ash pit is scheduled to be addressed as part of a *Comprehensive Environmental Response, Compensation and Liability Act* (CERCLA) *of 1980* operable unit at a later date.

8. List any environmental information you know about that has been prepared, or will be prepared, directly related to this proposal.

This *State Environmental Policy Act* (SEPA) *of 1971* Environmental Checklist is being submitted to Ecology concurrently with the *200 West Ash Pit Demolition Site* closure plan.

General Hanford Site information is found in the *Hanford Site National Environmental Policy Act (NEPA) Characterization* document, PNL-6415, Revision 4, Pacific Northwest Laboratory, 1991, Richland, Washington.

In accordance with the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement), additional information concerning the 200 West Ash Pit is located in the Waste Information Data System.

9. Do you know whether applications are pending for government approvals of other proposals directly affecting the property covered by your proposal? If yes, explain.

No applications to government agencies are known to be pending.

10. List any government approvals or permits that will be needed for your proposal, if known.

In accordance with the Tri-Party Agreement, Ecology is the lead regulatory agency that will approve the Ash Pit Demolition Site closure plan pursuant to the requirements of Washington Administrative Code, (WAC) 173-303-610 and 40 Code of Federal Regulations (CFR) Parts 265.381 and 270.1. A *National Environmental Policy Act* (NEPA) *of 1969* review will be required before closure can proceed.

11. Give brief, complete description of your proposal, including the proposed uses and the size of the project and site. There are several questions later in this checklist that ask you to describe certain aspects of your proposal. You do not need to repeat those answers on this page.

The proposed action is the clean closure of the Ash Pit Demolition Site. The Ash Pit Demolition Site consists of a square parcel of land approximately 20 feet (6 meters) by 20 feet (6 meters), which is situated within a multi-use borrow pit area, the ash pit, roughly 600 feet (183 meters) by 800 feet (244 meters) in size. The Ash Pit Demolition Site was used to detonate shock-sensitive and reactive laboratory chemicals that were determined to be either excess or beyond their designated stock life. Two detonation events occurred in November of 1984 and June of 1986.

The discarded chemicals were placed in shallow depressions to control the detonation process. Explosives were placed around the chemicals and detonated using electric blasting caps and primer cord.

Because of the location of the ash pit within the 200 West Area, the closure investigation began with a radiation survey of the demolition site. The results of the radiation survey confirmed that there is no radiation above background levels at the Ash Pit Demolition Site. Any radiation encountered would have been from 200 West Area activities not associated with the Ash Pit Demolition Site. Soil samples would be taken to determine if there is any contamination and the resulting action levels would be determined. Action levels are contaminant concentrations that would require a cleanup response and would be negotiated with Ecology. If it is found that all contamination present is from the Ash Pit Demolition Site activities alone and is above action levels, the soil would be treated and/or disposed of in a permitted landfill and the demolition site closed as a RCRA site. If it is found that all contamination is from other nearby sources, the Ash Pit Demolition Site would be closed as a RCRA site and remediated under CERCLA as part of 200-SS-2 operable unit, which contains the ash pit. If, however, the soil is contaminated from other sources in addition to the Ash Pit Demolition Site activities, the soil would be remediated in coordination with CERCLA as part of the 200-SS-2 operable unit. All equipment used in performing closure activities would be decontaminated or disposed of at a permitted facility.

Postclosure care would be required only if the treatment unit cannot attain clean closure. If the underlying soils or the groundwater are contaminated, the site will not be considered closed until the remediation under CERCLA is complete.

12. **Location of the proposal. Give sufficient information for a person to understand the precise location of your proposed project, including a street address, if any, and section, township, and range, if known. If a proposal would occur over a range of area, provide the range or boundaries of the site(s). Provide a legal description, site plan, vicinity map, and topographic map, if reasonably available. While you should submit any plans required by the agency, you are not required to duplicate maps or detailed plans submitted with any permit applications related to this checklist.**

The ash pit site is located on the eastern boundary of the 200 West Area. The demolition site is located within the ash pit. The location within the 200 West Area is approximately 1,500 feet (457 meters) northeast of the U Plant and approximately 1,000 feet (305 meters) southwest of the main entrance to the 200 West Area (20th Street). The 200 West Area is located roughly in the center of the Hanford Site, Section 6, Township 12 N, Range 26 E.

B. ENVIRONMENTAL ELEMENTS

1. Earth

a. General description of the site (circle one): Flat, rolling, hilly, steep slopes, mountainous, other_____.

Flat terrain.

b. What is the steepest slope on the site (approximate percent slope)?

The steepest slope in the 200 West Area is less than 10 percent.

c. What general types of soils are found on the site? (for example, clay, sandy gravel, peat, muck)? If you know the classification of agricultural soils, specify them and note any prime farmland.

The main soil types found in the area are sand and loess. Some of the sand present is in the form of shallow sand dunes.

d. Are there surface indications or history of unstable soils in the immediate vicinity? If so, describe.

The presence of sand dunes in the area indicate some instability of the soils in the vicinity, but the floor of the ash pit has been disturbed in such a manner as to stabilize the soil.

e. Describe the purpose, type, and approximate quantities of any filling or grading proposed. Indicate source of fill.

No fill will be required by this closure.

f. Could erosion occur as a result of clearing, construction, or use? If so, generally describe.

No.

g. About what percent of the site will be covered with impervious surfaces after project construction (for example, asphalt or buildings)?

None.

h. Proposed measures to reduce or control erosion, or other impacts to the earth, if any:

None.

2. Air

a. What types of emissions to the air would result from the proposal (i.e., dust, automobile, odors, industrial wood smoke) during construction and when the project is completed? If any, generally describe and give approximate quantities, if known.

There could be minor dust and vehicle exhaust from closure activities. No volatile organic carbon emissions are expected because the detonation events were designed to eliminate most of the chemicals and the events occurred in 1984 and 1986.

b. Are there any off-site sources of emissions or odors that may affect your proposal? If so, generally describe.

No.

c. Proposed measures to reduce or control emissions or other impacts to the air, if any?

None.

3. Water

a. Surface

1) Is there any surface water body on or in the immediate vicinity of the site (including year-round and seasonal streams, saltwater, lakes, ponds, wetlands)? If yes, describe type and provide names. If appropriate, state what stream or river it flows into.

No.

2) Will the project require any work over, in, or adjacent to (within 200 feet) the described waters? If yes, please describe and attach available plans.

No.

3) Estimate the amount of fill and dredge material that would be placed in or removed from surface water or wetlands and indicate the area of the site that would be affected. Indicate the source of fill material.

None.

4) Will the proposal require surface water withdrawals or diversions? Give general description, purpose, and approximate quantities if known.

No.

5) Does the proposal lie within a 100-year floodplain? If so, note location on the site plan.

No.

6) Does the proposal involve any discharges of waste materials to surface waters? If so, describe the type of waste and anticipated volume of discharge.

No.

b. Ground

1) Will ground water be withdrawn, or will water be discharged to ground water? Give general description, purpose, and approximate quantities if known.

No.

2) Describe waste material that will be discharged into the ground from septic tanks or other sources, if any (for example: Domestic sewage; industrial, containing the following chemicals...; agricultural; etc.). Describe the general size of the system, the number of such systems, the number of houses to be served (if applicable), or the number of animals or humans the system(s) are expected to serve.

None.

c. Water Run-off (including storm water)

1) Describe the source of run-off (including storm water) and method of collection and disposal, if any (include quantities, if known). Where will this water flow? Will this water flow into other waters? If so, describe.

The Hanford Site receives approximately 6 to 7 inches (15 to 18 centimeters) of annual precipitation that seeps into the ground through the porous soils at the site. Because of the low rainfall and the warm climate, this water will return to the air through evapotranspiration.

2) Could waste materials enter ground or surface waters? If so, generally describe.

No.

d. Proposed measures to reduce or control surface, ground, and run-off water impacts, if any:

None.

4. Plants

a. Check or circle the types of vegetation found on the site.

___ deciduous tree: alder, maple, aspen, other
___ evergreen tree: fir, cedar, pine, other
___ shrubs
X grass
___ pasture
___ crop or grain
___ wet soil plants: cattail, buttercup, bulrush, skunk cabbage, other
___ water plants: water lily, eelgrass, milfoil, other
X other types of vegetation

Forbes and grasses might be seasonally present.

b. What kind and amount of vegetation will be removed or altered?

The 200 West Ash Pit is a disturbed site and contains only small quantities of grasses and\or forbes.

c. List threatened or endangered species known to be on or near the site.

There are no known threatened or endangered species found to exist in or near the demolition site.

d. Proposed landscaping, use of native plants, or other measures to preserve or enhance vegetation on the site, if any:

Because the entire ash pit might still be used for occasional ash disposal, and is scheduled to be remediated under future CERCLA activities, no revegetation or landscaping would occur under this closure plan.

5. Animals

a. Circle any birds and animals which have been observed on or near the site or are known to be on or near the site:

birds: hawk, heron, eagle, songbirds, other:.....
mammals: deer, bear, elk, beaver, other:.....
fish: bass, salmon, trout, herring, shellfish, other:.....

While there are many species of animals found on the Hanford Site, none of these exclusively use the demolition site area. Additional information on the Hanford Site animals can be found in the environmental document referred to in the answer to Checklist Question A.8.

b. **List any threatened or endangered species known to be on or near the site.**

The demolition site is not known to be used by any threatened or endangered species. Additional information regarding endangered species on the Hanford Site can be found in the environmental document referred to in the answer to Checklist Question A.8.

c. **Is the site part of a migration route? If so, explain.**

While the Hanford Site and the adjacent Columbia River are part of the broad Pacific Flyway for waterfowl migration, the ash pit site itself is not used in such a manner.

d. **Proposed measures to preserve or enhance wildlife, if any:**

None.

6. **Energy and Natural Resources**

a. **What kinds of energy (electric, natural gas, oil, wood stove, solar) will be used to meet the completed project's energy needs? Describe whether it will be used for heating, manufacturing, etc.**

None.

b. **Would your project affect the potential use of solar energy by adjacent properties? If so, generally describe.**

No.

c. **What kinds of energy conservation features are included in the plans of this proposal? List other proposed measures to reduce or control energy impacts, if any:**

None.

7. **Environmental Health**

a. **Are there any environmental health hazards, including exposure to toxic chemicals, risk of fire and explosion, spill, or hazardous waste, that could occur as a result of this proposal? If so, describe.**

It is believed that the waste inventory that was treated, which consisted of discarded explosive, ignitable, and/or reactive, nonradioactive chemical compounds, was totally consumed during the various thermal detonation events. It also is believed that any remaining residues should have been decomposed by the natural processes of oxidation and hydration. It is also possible that some dangerous residues might have remained on the site along with small shards of glass or metal remnants from the containers that were detonated.

1) Describe special emergency services that might be required.

Hanford Site security, fire response, and ambulance services are on call at all times in the event of an onsite emergency.

2) Proposed measures to reduce or control environmental health hazards, if any:

The sampling will determine if there are any remaining residues that might pose a threat to human health or the environment. If there are, the contaminated soil will be removed and disposed of in permitted disposal sites. Removal would be carried out in accordance with approved procedures for removal of dangerous waste by trained waste workers.

b. Noise

1) What type of noise exists in the area which may affect your project (for example: traffic, equipment, operation, other)?

None.

2) What types and levels of noise would be created by or associated with the project on a short-term or a long-term basis (for example: traffic, construction, operation, other)? Indicate what hours noise would come from the site.

There would be minor noise from equipment used for sampling and closure activities during normal day shift operations.

3) Proposed measures to reduce or control noise impacts, if any:

None.

8. Land and Shoreline Use

a. What is the current use of the site and adjacent properties?

The Ash Pit Demolition Site is currently part of the larger ash pit. This larger ash pit was used and might still be used for a variety of activities such as tumbleweed incineration and ash disposal. These other uses of the ash pit do not impact the proposed activities for the demolition site.

b. Has the site been used for agriculture? If so, describe.

No portion of the Hanford Site, including the site of the proposed unit, has been used for agricultural purposes since 1943.

c. Describe any structures on the site.

None.

d. **Will any structures be demolished? If so, what?**

No.

e. **What is the current zoning classification of the site?**

The Hanford Site is zoned by Benton County as an Unclassified Use (U) district.

f. **What is the current comprehensive plan designation of the site?**

The 1985 Benton County Comprehensive Land Use Plan designates the Hanford Site as the "Hanford Reservation." Under this designation, land on the Site may be used for "activities nuclear in nature." Nonnuclear activities are authorized "if and when DOE approval for such activities is obtained."

g. **If applicable, what is the current shoreline master program designation of the site?**

Not applicable.

h. **Has any part of the site been classified as an "environmentally sensitive" area? If so, specify.**

No.

i. **Approximately how many people would reside or work in the completed project?**

None.

j. **Approximately how many people would the completed project displace?**

None.

k. **Proposed measures to avoid or reduce displacement impacts, if any:**

None.

l. **Proposed measures to ensure the proposal is compatible with existing and projected land uses and plans, if any:**

Does not apply. (Refer to answer to Checklist Question B.8.f.)

9. Housing

a. **Approximately how many units would be provided, if any? Indicate whether high, middle, or low-income housing.**

None.

b. Approximately how many units, if any, would be eliminated? Indicate whether high, middle, or low-income housing.

None.

c. Proposed measures to reduce or control housing impacts, if any:

None.

10. Aesthetics

a. What is the tallest height of any proposed structure(s), not including antennas; what is the principal exterior building material(s) proposed?

No structures are proposed.

b. What views in the immediate vicinity would be altered or obstructed?

None.

c. Proposed measures to reduce or control aesthetic impacts, if any:

None.

11. Light and Glare

a. What type of light or glare will the proposal produce? What time of day would it mainly occur?

None.

b. Could light or glare from the finished project be a safety hazard or interfere with views?

No.

c. What existing off-site sources of light or glare may affect your proposal?

None.

d. Proposed measures to reduce or control light and glare impacts, if any:

None.

12. Recreation

a. What designated and informal recreational opportunities are in the immediate vicinity?

None.

b. **Would the proposed project displace any existing recreational uses? If so, describe.**

No.

c. **Proposed measures to reduce or control impacts on recreation, including recreation opportunities to be provided by the project or applicant, if any?**

None.

13. **Historic and Cultural Preservation**

a. **Are there any places or objects listed on, or proposed for, national, state, or local preservation registers known to be on or next to the site? If so, generally describe.**

No places or objects listed on, or proposed for, national, state, or local preservation registers are known to be on or next to the site. Additional information regarding the cultural resources on the Hanford Site environment can be found in the environmental documents referred to in the answer to Checklist Question A.8.

b. **Generally describe any landmarks or evidence of historic, archaeological, scientific, or cultural importance known to be on or next to the site.**

There are no known archaeological, historical, or Native American religious sites on or next to the unit. Additional information regarding this can be found in the environmental documents referenced in the answer to Checklist Question A.8.

c. **Proposed measures to reduce or control impacts, if any:**

None.

14. **Transportation**

a. **Identify public streets and highways serving the site, and describe proposed access to the existing street system. Show on site plans, if any.**

Does not apply.

b. **Is site currently served by public transit? If not, what is the approximate distance to the nearest transit stop?**

The unit is a controlled location and public transportation is not allowed to the site.

c. How many parking spaces would the completed project have? How many would the project eliminate?

None.

d. Will the proposal require any new roads or streets, or improvements to existing roads or streets, not including driveways? If so, generally describe (indicate whether public or private).

No.

e. Will the project use (or occur in the immediate vicinity of) water, rail, or air transportation? If so, generally describe.

No.

f. How many vehicular trips per day would be generated by the completed project? If known, indicate when peak volumes would occur.

None.

g. Proposed measures to reduce or control transportation impacts if any:

None.

15. Public Services

a. Would the project result in an increased need for public services (for example: fire protection, police protection, health care, schools, other)? If so, generally describe.

No.

b. Proposed measures to reduce or control direct impacts on public services, if any:

None.

16. Utilities

a. Circle utilities currently available at the site: electricity, natural gas, water, refuse service, telephone, sanitary sewer, septic system, other:

None.

b. Describe the utilities that are proposed for the project, the utility providing the service, and the general construction activities on the site or in the immediate vicinity which might be needed.

None.

SIGNATURES

The above answers are true and complete to the best of my knowledge. We understand that the lead agency is relying on them to make its decision.

James D. Bauer — 11/20/92

J. D. Bauer, Acting Program Manager
Office of Environmental Assurance,
Permits, and Policy
U.S. Department of Energy
Richland Field Office

Date

R E Lerch — 10-30-92

R. E. Lerch, Deputy Director
Restoration and Remediation
Westinghouse Hanford Company

Date

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200 WEST ASH PIT DEMOLITION SITE
CLOSURE PLAN

FOREWORD

The Hanford Facility is owned by the U.S. Government and operated by the U.S. Department of Energy, Richland Field Office. Dangerous waste and mixed waste (containing both radioactive and dangerous components) are managed and produced on the Hanford Facility, a portion of the 560 square mile (1,450 square kilometer) Hanford Site. The dangerous waste is regulated in accordance with the *Resource Conservation and Recovery Act of 1976* and the *State of Washington Hazardous Waste Management Act of 1976* (as administered through the Washington State Department of Ecology *Dangerous Waste Regulations*, Washington Administrative Code 173-303). The radioactive component of mixed waste is interpreted by the U.S. Department of Energy to be regulated under the *Atomic Energy Act of 1954*; the nonradioactive dangerous component of mixed waste is interpreted to be regulated under the *Resource Conservation and Recovery Act* and Washington Administrative Code 173-303.

For purposes of the *Resource Conservation and Recovery Act* and the Washington State Department of Ecology *Dangerous Waste Regulations*, the Hanford Facility is considered to be a single facility. The single dangerous waste permit identification number issued to the Hanford Facility by the U.S. Environmental Protection Agency and the Washington State Department of Ecology is U.S. Environmental Protection Agency/State Identification Number WA7890008967. This identification number encompasses over 60 treatment, storage, and/or disposal units within the Hanford Facility. Over half of the treatment, storage, and/or disposal units are no longer operating and will be closed under interim status (using final status standards in Washington Administrative Code 173-303-610).

Westinghouse Hanford Company is a major contractor to the U.S. Department of Energy, Richland Field Office and serves as co-operator of the 200 West Ash Pit Demolition Site, the unit addressed in this closure plan.

Westinghouse Hanford Company is identified in the closure plan as a "co-operator" and signs in that capacity. Any identification of Westinghouse Hanford Company as an 'operator' elsewhere in this closure plan is not meant to conflict with Westinghouse Hanford Company's designation as a co-operator but rather is based on Westinghouse Hanford Company's contractual status (i.e., as an operations and engineering contractor) for the U.S. Department of Energy.

The *200 West Ash Pit Demolition Site Closure Plan* consists of a Part A Permit Application (Revision 3) and a closure plan. An explanation of the Part A Permit Application revision is provided at the beginning of the Part A section. The closure plan consists of nine chapters and three appendices.

This *200 West Ash Pit Demolition Site Closure Plan* submittal contains information current as of October 15, 1992.

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ACRONYMS AND ABBREVIATIONS

Ash Pit Demolition Site	200 West Ash Pit Demolition Site
ASTM	American Society of Testing and Materials
CERCLA	*Comprehensive Environmental Response, Compensation, and Liability Act of 1980*
DOE-RL	U.S. Department of Energy, Richland Field Office
Ecology	Washington State Department of Ecology
EII	environmental investigation instructions
EIS	environmental impact statement
EPA	Environmental Protection Agency
HEIS	Hanford Environmental Information System
QAPjP	quality assurance project plan
QI	quality instruction
QR	quality requirement
RCRA	*Resource Conservation and Recovery Act of 1976*
TCL	target compound list
TIC	tentatively identified compounds
Tri-Party Agreement	*Hanford Federal Facility Agreement and Consent Order*
TSD	treatment, storage, and/or disposal
WAC	Washington Administrative Code

DEFINITION OF TERMS

Definitions are based on use throughout this document.

Accuracy--The degree of agreement between a measurement (or the mean value of a set of measurements) to the true value. For purposes of sampling activities, accuracy is the measure of the bias in a measurement system. Sampling accuracy normally is assessed through the evaluation of sample blanks, while analytical method accuracy and specific sample matrix effects are assessed through the analysis of control standards and spiked samples.

Audit--For the purposes of sampling activities, audits are considered to be systematic checks to verify the quality of operation of one or more elements of the total measurement system. In this sense, audits could be of two types: (1) performance audits, in which quantitative data are independently obtained for comparison with data routinely obtained in a measurement system or (2) system audits, involving a qualitative onsite evaluation of laboratories or other organizational elements of the measurement system for compliance with established quality assurance program and procedure requirements. For

environmental investigations at the Hanford Site, performance audit requirements are fulfilled by periodic submittal of blind samples to the primary laboratory or the analysis of split samples by an independent laboratory. System audit requirements are implemented through the use of standard surveillance procedures.

Comparability--For the purposes of sampling activities, comparability is an expression of the relative confidence with which one data set might be compared with another.

Completeness--For the purposes of sampling activities, completeness is a quantitative parameter expressing the percentage of measurements judged to be valid.

Deviation--For the purpose of sampling activities, deviation refers to a planned departure from established criteria that might be required as a result of unforeseen field situations or that might be required to correct ambiguities in procedures that may arise in practical applications.

Facility/facility--Dependent on context, the term 'facility', as used in this closure plan, could refer to the following.

The Hanford Facility is a single *Resource Conservation and Recovery Act* (RCRA) *of 1976* facility, identified by the EPA/State Identification Number WA7890008967, that consists of over 60 treatment, storage, and/or disposal (TSD) units included in the *Hanford Facility Dangerous Waste Part A Permit Application* (DOE-RL 1988b). The Hanford Facility consists of the contiguous portion of the Hanford Site that contains these TSD units and, for the purposes of RCRA, is owned and operated by the U.S. Department of Energy (excluding lands north and east of the Columbia River, river islands, lands owned by the Bonneville Power Administration, lands leased to the Washington Public Power Supply System, and lands owned by or leased to the state of Washington).

A facility as defined in WAC 173-303-040, i.e., building nomenclature commonly used at the Hanford Facility. In this context, the term 'facility' remains as part of the title for various TSD units (e.g., 2727-S Storage Facility, Hexone Storage and Treatment Facility).

Nonconformance--A nonconformance is a deficiency in characteristic, documentation, or procedure that renders the quality of material, equipment, services, or activities unacceptable or indeterminate. When the deficiency is of a minor nature, does not effect a permanent or significant change in quality if it is not corrected, and can be brought into conformance with immediate corrective action, the deficiency shall not be categorized as a nonconformance. However, if the nature of the condition is such that it cannot be immediately and satisfactorily corrected, it shall be documented in compliance with approved procedures and brought to the attention of management for disposition and appropriate corrective action.

Precision--Precision is a measure of the repeatability or reproducibility of specific measurements under a given set of conditions. Specifically,

precision is a quantitative measure of the variability of a group of measurements compared to their average value. Precision normally is expressed in terms of standard deviation, but also could be expressed as the coefficient of variation (i.e., relative standard deviation) and range (i.e., maximum value minus minimum value). Precision is assessed by means of duplicate and/or replicate sample analysis.

Quality assurance--For the purposes of sampling activities, quality assurance refers to the total integrated quality planning, quality control, quality assessment, and corrective action activities that collectively ensure that the data from monitoring and analysis meet all end user requirements and/or the intended end use of the data.

Quality assurance project plan--The quality assurance project plan is an orderly assembly of management policies, project objectives, methods, and procedures that defines how data of known quality will be produced for a particular project or investigation.

Quality control--For the purposes of sampling activities, quality control refers to the routine application of procedures and defined methods to the performance of sampling, measurement, and analytical processes.

Replicate sample--Replicate samples are two aliquots removed from the same sample container in the laboratory and analyzed independently.

Representativeness--For the purposes of sampling activities, representativeness is the degree to which data accurately and precisely represent a characteristic of a population parameter, variations at a sampling point, or an environmental condition. Representativeness is a qualitative parameter that is most concerned with the proper design of a sampling program.

Site-wide background--The natural background established for the Hanford Site. Includes all contributions from anthropogenetic sources unrelated to Hanford Site operations.

Validation--For the purposes of sampling activities, validation refers to a systematic process of reviewing a body of data against a set of criteria to provide assurance that the data are acceptable for their intended use.

Verification--For the purposes of sampling activities, verification refers to the process of determining whether procedures, processes, data, or documentation conform to specified requirements. Verification activities might include inspections, audits, surveillances, or technical review.

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PART A

The Part A, Form 1, included in this closure plan was submitted to the Washington State Department of Ecology in May 1988. The Part A, Form 1, consists of three pages.

The original Part A, Form 3, Revision 0, was submitted to the Washington State Department of Ecology in November 1985. Revision 1 of the Part A, Form 3, was prepared to provide more extensive unit, process, and dangerous waste descriptions, and to remove dangerous waste code D001. Also, one drawing was revised and one drawing and one photograph were removed. Revision 2 of the Part A, Form 3, was prepared to include Westinghouse Hanford Company as co-operator of the Ash Pit Demolition Site. Revision 3 of the Part A, Form 3, was prepared to correct process design capacities, to provide more detailed process and dangerous waste descriptions, and to add dangerous waste codes D001, D002, WT01, and WT02. Also, the site drawing was revised and a new photograph was provided.

The Part A, Form 3 (Revision 3), included in this closure plan consists of seven pages, one figure, and one photograph.

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FORM 1

State of Washington Department of Ecology

WASHINGTON STATE

DANGEROUS WASTE PERMIT GENERAL INFORMATION

(Please read "Form 1 instructions" before starting)

I. EPA/STATE I.D. NUMBER

W A 7 8 9 0 1 0 0 8 9 6 7

II. NAME OF FACILITY

U.S. DEPARTMENT OF ENERGY-HANFORD SITE

III. FACILITY CONTACT

A. NAME & TITLE (last, first, & title)

LAWRENCE, MICHAEL J., MANAGER

B. PHONE (area code & no.)

5 0 9 3 7 6 7 3 9 5

IV. FACILITY MAILING ADDRESS

A. STREET OR P.O. BOX

P.O. BOX 550

B. CITY OR TOWN

RICHLAND

C. STATE

WA

D. ZIP CODE

9 9 3 5 2

V. FACILITY LOCATION

A. STREET, ROUTE NO. OR OTHER SPECIFIC IDENTIFIER

HANFORD SITE

B. COUNTY NAME

BENTON

C. CITY OR TOWN

RICHLAND

D. STATE

WA

E. ZIP CODE

9 9 3 5 2

F. COUNTY CODE (if known)

0 0 5

VI. SIC CODES (4-digit, in order of priority)

A. FIRST

9 7 1 1 (specify) NATIONAL SECURITY

B. SECOND

8 9 2 2 (specify) NUCLEAR NONCOMMERCIAL DEVELOPMENT AND EDUCATION

C. THIRD

9 6 1 1 (specify) ADMINISTRATION AND GENERAL ECONOMICS PROGRAM

D. FOURTH

4 9 1 1 (specify) STEAM-ELECTRIC GENERATION

VII. OPERATOR INFORMATION

A. NAME (DOE-RL)

DEPARTMENT OF ENERGY-RICHLAND OPERATIONS

WESTINGHOUSE HANFORD COMPANY (WHC)

B. Is the name listed in Item VII-A also the owner?

☒ YES ☐ NO

**

C. STATUS OF OPERATOR (Enter the appropriate letter into the answer box; if "Other", specify.)

F = FEDERAL S = STATE P = PRIVATE M = PUBLIC (other than federal or state) O = OTHER (specify)

F

(specify)

D. PHONE (area code & no.)

5 0 9 3 7 6 7 3 9 5

E. STREET OR P.O. BOX

PO BOX 550/PO BOX 1970

5 0 9 3 7 6 7 8 0 3

F. CITY OR TOWN

RICHLAND

G. STATE

WA

H. ZIP CODE

9 9 3 5 2

VIII. INDIAN LAND

Is this facility located on Indian lands?

☐ YES ☒ NO

**DOE-RL: OWNER/CO-OPERATOR; WHC: CO-OPERATOR FOR CERTAIN UNITS ON THE HANFORD SITE.

COMPLETE BACK PAGE

SCT 930-81

EQA 4-79

9 3 1 2 7 0 2 1 1 5 2

IX. MAP

Attach to this application a topographic map of the area extending to at least one mile beyond property boundaries. The map must show the outline of the facility, the location of each of its existing and proposed intake and discharge structures, each of its hazardous waste treatment, storage, or disposal facilities, and each well where it injects fluids underground. Include all springs, rivers and other surface water bodies in the map area. See instructions for precise requirements.

X. NATURE OF BUSINESS (provide a brief description)

- o NATIONAL DEFENSE NUCLEAR MATERIAL PRODUCTION
- o ENERGY RESEARCH AND TECHNOLOGY DEVELOPMENT
- o DEFENSE NUCLEAR WASTE MANAGEMENT
- o BYPRODUCT STEAM, SOLD FOR ELECTRIC POWER GENERATION

AND SIC 15: BUILDING CONSTRUCTION - GENERAL CONTRACTORS AND OPERATIVE BUILDERS

9 3 1 2 7 2 1 1 6 3

XI. CERTIFICATION (see instructions)

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments and that, based on my inquiry of those persons immediately responsible for obtaining the information contained in the application, I believe that the information is true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

A. NAME & OFFICIAL TITLE (type or print)	B. SIGNATURE	C. DATE SIGNED
SEE ATTACHMENT		

EPA Form 3510-1 (Revised)

WA7890008967

FORM 1

DANGEROUS WASTE PERMIT GENERAL INFORMATION

XI. CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this application and all attachments, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

Michael J. Lawrence — 5-19-88

Michael J. Lawrence
Manager, Richland Operations
United States Department of Energy

Date

W. M. Jacobi — 5/13/88

William M. Jacobi
President
Westinghouse Hanford Company
Co-operator

Date

Please print or type in the unshaded areas only
(fill-in areas are spaced for elite type, i.e., 12 character/inch).

FORM 3

DANGEROUS WASTE PERMIT APPLICATION

1. EPA/STATE I.D. NUMBER: W A 7 8 9 0 0 0 8 9 6 7

FOR OFFICIAL USE ONLY

APPLICATION APPROVED	DATE RECEIVED *(mo., day, & yr.)*	COMMENTS

II. FIRST OR REVISED APPLICATION

Place an "X" in the appropriate box in A or B below (mark one box only) to indicate whether this is the first application you are submitting for your facility or a revised application. If this is your first application and you already know your facility's EPA/STATE I.D. Number, or if this is a revised application, enter your facility's EPA/STATE I.D. Number in Section I above.

A. FIRST APPLICATION *(place an "X" below and provide the appropriate date)*

☐ 1. EXISTING FACILITY *(See instructions for definition of "existing" facility. Complete item below.)*

MO. 0 8 | DAY | YR. 8 4

FOR EXISTING FACILITIES, PROVIDE THE DATE *(mo., day, & yr.)* OPERATION BEGAN OR THE DATE CONSTRUCTION COMMENCED *(use the boxes to the left)*

☐ 2. NEW FACILITY *(Complete item below)*

MO. | DAY | YR.

FOR NEW FACILITIES, PROVIDE THE DATE, *(mo., day, & yr)* OPERATION BEGAN OR IS EXPECTED TO BEGIN

B. REVISED APPLICATION *(place an "X" below and complete Section I above)*

☒ 1. FACILITY HAS AN INTERIM STATUS PERMIT

☐ 2. FACILITY HAS A FINAL PERMIT

III. PROCESSES - CODES AND CAPACITIES

A. PROCESS CODE - Enter the code from the list of process codes below that best describes each process to be used at the facility. Ten lines are provided for entering codes. If more lines are needed, enter the code(s) in the space provided. If a process will be used that is not included in the list of codes below, then describe the process *(including its design capacity)* in the space provided on the *(Section III-C)*.

B. PROCESS DESIGN CAPACITY - For each code entered in column A enter the capacity of the process.

1. AMOUNT - Enter the amount.

2. UNIT OF MEASURE - For each amount entered in column B(1), enter the code from the list of unit measure codes below that describes the unit of measure used. Only the units of measure that are listed below should be used.

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Storage:		
CONTAINER (barrel, drum, etc)	S01	GALLONS OR LITERS
TANK	S02	GALLONS OR LITERS
WASTE PILE	S03	CUBIC YARDS OR CUBIC METERS
SURFACE IMPOUNDMENT	S04	GALLONS OR LITERS
Disposal:		
INJECTION WELL	D80	GALLONS OR LITERS
LANDFILL	D81	ACRE-FEET *(the volume that would cover one acre to a depth of one foot)* OR HECTARE-METER
LAND APPLICATION	D82	*ACRES OR HECTARES*
OCEAN DISPOSAL	D83	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	D84	GALLONS OR LITERS

PROCESS	PROCESS CODE	APPROPRIATE UNITS OF MEASURE FOR PROCESS DESIGN CAPACITY
Treatment:		
TANK	T01	GALLONS PER DAY OR LITERS PER DAY
SURFACE IMPOUNDMENT	T02	GALLONS PER DAY OR LITERS PER DAY
INCINERATOR	T03	TONS PER HOUR OR METRIC TONS PER HOUR; GALLONS PER HOUR OR LITERS PER HOUR
OTHER (Use for physical, chemical, thermal or biological treatment processes not occurring in tanks, surface impoundments or incinerators. Describe the processes in the space provided; Section III-C.)	T04	GALLONS PER DAY OR LITERS PER DAY

UNIT OF MEASURE	UNIT OF MEASURE CODE
GALLONS	G
LITERS	L
CUBIC YARDS	Y
CUBIC METERS	C
GALLONS PER DAY	U
LITERS PER DAY	V
TONS PER HOUR	D
METRIC TONS PER HOUR	W
GALLONS PER HOUR	E
LITERS PER HOUR	H
ACRE-FEET	A
HECTARE-METER	F
ACRES	B
HECTARES	Q

EXAMPLE FOR COMPLETING SECTION III *(shown in line numbers X-1 and X-2 below): A facility has two storage tanks, one tank can hold 200 gallons and the other can hold 400 gallons.* The facility also has an incinerator that can burn up to 20 gallons per hour.

LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	B. 2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY	LINE NUMBER	A. PROCESS CODE *(from list above)*	B. PROCESS DESIGN CAPACITY 1. AMOUNT *(specify)*	B. 2. UNIT OF MEASURE *(enter code)*	FOR OFFICIAL USE ONLY
X-1	S 0 2	600	G		5				
X-2	T 0 3	20	E		6				
1	T 0 4	150	U		7				
2					8				
3					9				
4					10				

Continued from the front.

PROCESSES (continued)

SPACE FOR ADDITIONAL PROCESS CODES OR FOR DESCRIBING OTHER PROCESS (code "T04"). FOR EACH PROCESS ENTERED HERE INCLUDE DESIGN CAPACITY.

T04

The 200 West Area Ash Pit Demolition Site (Ash Pit Demolition Site) is located in the 200 West Area of the Hanford Facility. The Ash Pit Demolition Site was used to detonate explosive waste that was generated on the Hanford Site. The process design capacity for treatment at the Ash Pit Demolition Site was 150 gallons (569 liters) per day.

IV. DESCRIPTION OF DANGEROUS WASTES

A. DANGEROUS WASTE NUMBER - Enter the four digit number from Chapter 173-303 WAC for each listed dangerous waste you will handle. If you handle dangerous wastes which are not listed in Chapter 173-303 WAC, enter the four digit number(s) that describes the characteristics and/or the toxic contaminants of those dangerous wastes.

B. ESTIMATED ANNUAL QUANTITY - For each listed waste entered in column A estimate the quantity of that waste that will be handled on an annual basis. For each characteristic or toxic contaminant entered in column A estimate the total annual quantity of all the non-listed waste(s) that will be handled which possess that characteristic or contaminant.

C. UNIT OF MEASURE - For each quantity entered in column B enter the unit of measure code. Units of measure which must be used and the appropriate codes are:

ENGLISH UNIT OF MEASURE	CODE	METRIC UNIT OF MEASURE	CODE
POUNDS	P	KILOGRAMS	K
TONS	T	METRIC TONS	M

If facility records use any other unit of measure for quantity, the units of measure must be converted into one of the required units of measure taking into account the appropriate density or specific gravity of the waste.

D. PROCESSES

1. PROCESS CODES:

For listed dangerous waste: For each listed dangerous waste entered in column A select the code(s) from the list of process codes contained in Section III to indicate how the waste will be stored, treated, and/or disposed of at the facility.

For non-listed dangerous wastes: For each characteristic or toxic contaminant entered in Column A, select the code(s) from the list of process codes contained in Section III to indicate all the processes that will be used to store, treat, and/or dispose of all the non-listed dangerous wastes that possess that characteristic or toxic contaminant.

Note: Four spaces are provided for entering process codes. If more are needed: (1) Enter the first three as described above; (2) Enter "000" in the extreme right box of Item IV-D(1); and (3) Enter in the space provided on page 4, the line number and the additional code(s).

2. PROCESS DESCRIPTION: If a code is not listed for a process that will be used, describe the process in the space provided on the form.

NOTE: DANGEROUS WASTES DESCRIBED BY MORE THAN ONE DANGEROUS WASTE NUMBER - Dangerous wastes that can be described by more than one Waste Number shall be described on the form as follows:

1. Select one of the Dangerous Waste Numbers and enter it in column A. On the same line complete columns B, C, and D by estimating the total annual quantity of the waste and describing all the processes to be used to treat, store, and/or dispose of the waste.
2. In column A of the next line enter the other Dangerous Waste Number that can be used to describe the waste. In column D(2) on that line enter "included with above" and make no other entries on that line.
3. Repeat step 2 for each other Dangerous Waste Number that can be used to describe the dangerous waste.

EXAMPLE FOR COMPLETING SECTION IV *(shown in line numbers X-1, X-2, X-3, and X-4 below)* - A facility will treat and dispose of an estimated 900 pounds per year of chrome shavings from leather tanning and finishing operation. In addition, the facility will treat and dispose of three non-listed wastes. Two wastes are corrosive only and there will be an estimated 200 pounds per year of each waste. The other waste is corrosive and ignitable and there will be an estimated 100 pounds per year of that waste. Treatment will be in an incinerator and disposal will be in a landfill.

LINE NO.	A. DANGEROUS WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)	D. PROCESSES 2. PROCESS DESCRIPTION (if a code is not entered in D(1))
X-1	K 0 5 4	900	P	T 0 3 D 8 0	
X-2	D 0 0 2	400	P	T 0 3 D 8 0	
X-3	D 0 0 1	100	P	T 0 3 D 8 0	
X-4	D 0 0 2			T 0 3 D 8 0	included with above

Continued from page 2.
NOTE: Photocopy this page before completing if you have more than 26 wastes to list.

NUMBER *(entered from page 1)*

W	A	7	8	9	0	0	0	8	9	6	7

IV. DESCRIPTION OF DANGEROUS WASTES (continued)

LINE NO.	A. DANGEROUS WASTE NO. *(enter code)*	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE *(enter code)*	D. PROCESSES 1. PROCESS CODES *(enter)*	D. PROCESSES 2. PROCESS DESCRIPTION *(if a code is not entered in D(1))*
1	D001	1,000	K	T04	Treatment-Other (Demolition)
2	D002				
3	D003				
4	D007				
5	D018				
6	P003				
7	U019				
8	U056				
9	U098				
10	U108				
11	U112				
12	U117				
13	U133				
14	U135				
15	U154				
16	U213				
17	U220				
18	WC01				
19	WP01				
20	WT01				
21	WT02				Included with above.
22					
23					
24					
25					
26					

Continued from the front.

ESCRIPTION OF DANGEROUS WASTES (continued)

E THIS SPACE TO LIST ADDITIONAL PROCESS CODES FROM SECTION D(1) ON PAGE 3.

The Ash Pit Demolition Site was used for the treatment of shock-sensitive or potentially explosive chemical waste. This waste exhibited the dangerous waste characteristics of ignitability (D001) and reactivity (D003). Some of the compounds also exhibited the dangerous waste characteristic of corrosivity (D002) and may have the state-only designations for toxic dangerous waste (WT02) and carcinogenic extremely hazardous waste (WC01). The estimated annual quantity of waste of 1,000 kilograms (2204 pounds) represents the total amount of waste that is believed to have been treated at the Ash Pit Demolition Site.

CILITY DRAWING

All existing facilities must include in the space provided on page 5 a scale drawing of the facility *(see instructions for more detail)*.

VI. PHOTOGRAPHS

All existing facilities must include photographs *(aerial or ground-level)* that clearly delineate all existing structures; existing storage, treatment and disposal areas; and sites of future storage, treatment or disposal areas *(see instructions for more detail)*.

VII. FACILITY GEOGRAPHIC LOCATION This information is provided on the attached drawings and photos.

LATITUDE *(degrees, minutes, & seconds)*	LONGITUDE *(degrees, minutes, & seconds)*

VIII. FACILITY OWNER

[x] A. If the facility owner is also the facility operator as listed in Section VII on Form 1, "General Information", place an "X" in the box to the left and skip to Section IX below.

B. If the facility owner is not the facility operator as listed in Section VII on Form 1, complete the following items:

1. NAME OF FACILITY'S LEGAL OWNER	2. PHONE NO. *(area code & no.)*

3. STREET OR P.O. BOX	4. CITY OR TOWN	5. ST.	6. ZIP CODE

IX. OWNER CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
John D. Wagoner, Manager U.S. Department of Energy Richland Field Office	John D. Wagoner	11/19/92

X. OPERATOR CERTIFICATION

I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment.

NAME *(print or type)*	SIGNATURE	DATE SIGNED
SEE ATTACHMENT		

X. OPERATOR CERTIFICATION

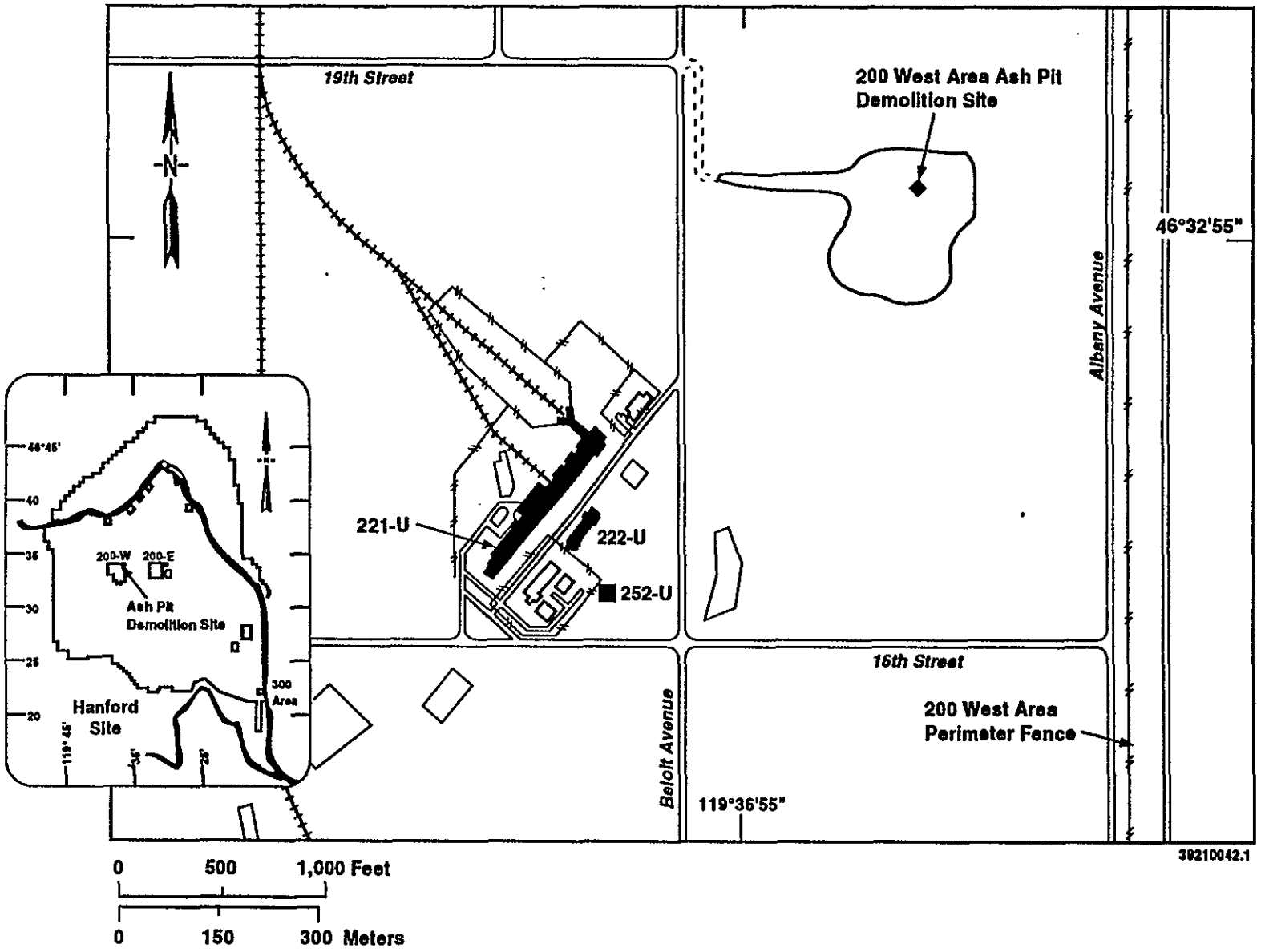
I certify under penalty of law that I have personally examined and am familiar with the information submitted in this and all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the submitted information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment.

John D. Wagoner — 11/18/92
Owner/Operator — Date
John D. Wagoner, Manager
U.S. Department of Energy
Richland Field Office

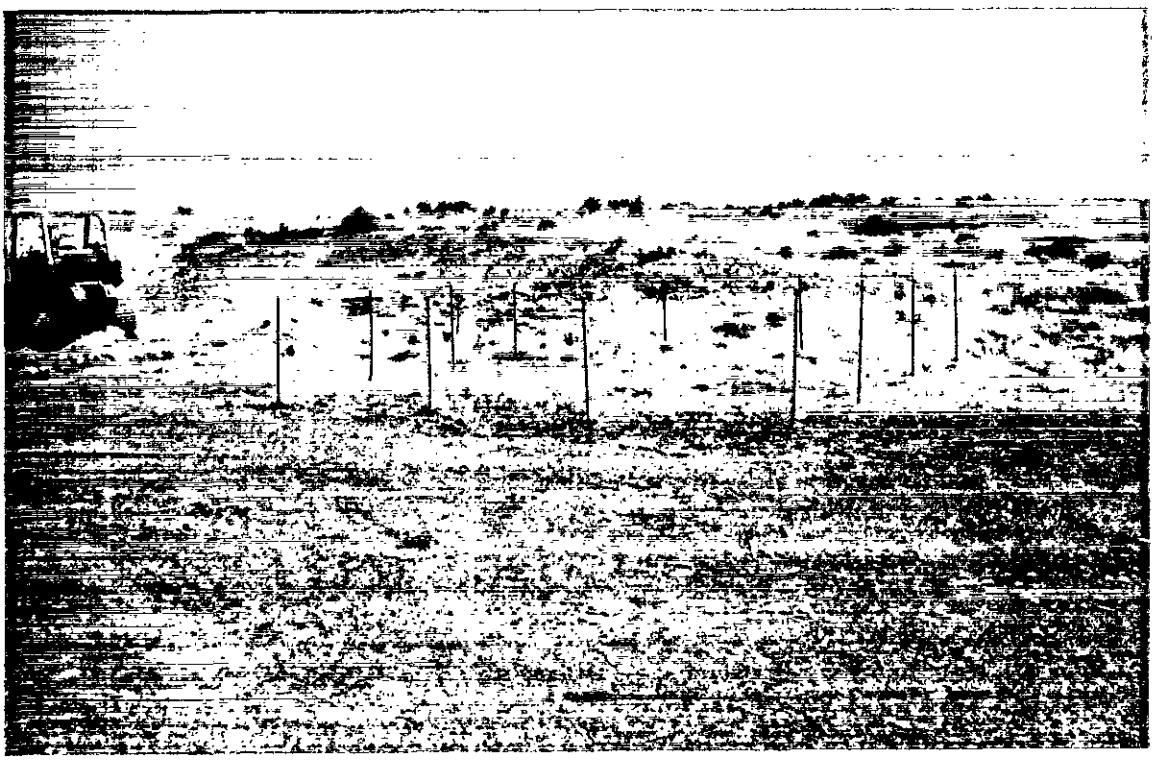
Thomas M. Anderson — 10-30-92
Co-Operator — Date
Thomas M. Anderson, President
Westinghouse Hanford Company

200 West Area Ash Pit Demolition Site

Site Plan



200 West Area Ash Pit Demolition Site



46°33'10.37"
119°36'44.58"

92070921-7W
(PHOTO TAKEN 1992)

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1.0 INTRODUCTION

This chapter provides background information for the 200 West Ash Pit Demolition Site (Ash Pit Demolition Site) and provides an overview of the contents of the Ash Pit Demolition Site closure plan.

1.1 BACKGROUND

The Ash Pit Demolition Site was the site of two known demolition events, one that occurred in November of 1984, and the second that occurred in June of 1986. These demolition events were a form of thermal treatment for spent or abandoned chemical waste. Because the Ash Pit Demolition Site will no longer be used for this thermal activity, the site will be closed. Closure will be conducted pursuant to the requirements of the Washington State Department of Ecology (Ecology) *Dangerous Waste Regulations*, Washington Administrative Code (WAC) 173-303-610 and 40 CFR 270.1. Closure also will satisfy closure requirements of WAC 173-303-680.

This closure plan presents a description of the Ash Pit Demolition Site, the history of the waste treated, and the approach that will be followed to close the Ash Pit Demolition Site. Because dangerous waste does not include the source, special nuclear, and by-product material components of mixed waste, radionuclides are not within the scope of WAC 173-303 or of this closure plan. The information on radionuclides is provided only for general knowledge where appropriate. Only dangerous constituents derived from Ash Pit Demolition Site operations will be addressed in this closure plan in accordance with WAC 173-303-610(2)(b)(i).

The Ash Pit Demolition Site is located within the 200-SS-2 (source) and 200-UP-1 (groundwater) operable units as designated in the *Hanford Federal Facility Agreement and Consent Order* (Tri-Party Agreement) (Ecology et al. 1990). The soil and groundwater of these operable units, 200-SS-2 and 200-UP-1, will be addressed through the *Comprehensive Environmental Response, Compensation, and Liability Act* (CERCLA) *of 1980* remedial investigation/feasibility study process. Therefore, any required remedial action, with respect to contaminants not associated with the Ash Pit Demolition Site, will be deferred to the CERCLA remedial investigation/feasibility study process. Characterization work on the 200-SS-2 operable unit is not expected to begin until sometime after fiscal year 1992. A work plan for the 200-UP-1 groundwater operable unit will begin in fiscal year 1993.

1.2 ASH PIT DEMOLITION SITE CLOSURE PLAN CONTENTS

The Ash Pit Demolition Site closure plan consists of the following nine chapters.

- Introduction (Chapter 1.0)
- Facility Description (Chapter 2.0)
- Process Information (Chapter 3.0)

- Waste Characteristics (Chapter 4.0)
- Groundwater Monitoring (Chapter 5.0)
- Closure Performance Standards (Chapter 6.0)
- Closure Activities (Chapter 7.0)
- Postclosure Plan (Chapter 8.0)
- References (Chapter 9.0).

A brief description of each chapter is provided in the following sections.

1.2.1 Facility Description (Chapter 2.0)

This chapter provides a brief description of the Hanford Site and the location and description of the Ash Pit Demolition Site. Information on Hanford Site security also is provided.

1.2.2 Process Information (Chapter 3.0)

This chapter describes how the Ash Pit Demolition Site processed the waste and explains the overall waste treatment system.

1.2.3 Waste Characteristics (Chapter 4.0)

This chapter discusses the waste inventory and the characteristics of the waste that was treated at the Ash Pit Demolition Site.

1.2.4 Groundwater Monitoring (Chapter 5.0)

This chapter discusses the probability that groundwater contamination has not occurred and that groundwater monitoring is not needed.

1.2.5 Closure Performance Standards (Chapter 6.0)

This chapter discusses the closure strategy, performance standards for protection of health and the environment, and closure activities.

1.2.6 Closure Activities (Chapter 7.0)

This chapter discusses sampling and analysis activities for closure. A closure schedule and a certification are included.

1.2.7 Postclosure Plan (Chapter 8.0)

This chapter outlines provisions for postclosure care if required.

1.2.8 References (Chapter 9.0)

References used throughout this closure plan are listed in this chapter. All references listed here, which are not available from other sources, will be made available for review, upon request, to any regulatory agency or public commentor. References can be obtained by contacting the following:

Administrative Records Specialist
Public Access Room H4-22
Westinghouse Hanford Company
P.O. Box 1970
Richland, Washington 99352

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2.2 HANFORD FACILITY DESCRIPTION 2-1

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FIGURES

2-1. Hanford Site F2-1
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2-3. Ash Pit Demolition Site Layout F2-3

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2.0 FACILITY DESCRIPTION

This chapter briefly describes the Hanford Site, the Hanford Facility, and the location of the Ash Pit Demolition Site, and provides information on the Hanford Site security.

2.1 GENERAL HANFORD SITE DESCRIPTION

The Hanford Site covers approximately 560 square miles (1,450 square kilometers) of semiarid land that is owned by the U.S. Government and managed by the U.S. Department of Energy, Richland Field Office (DOE-RL). The Hanford Site is located northwest of the city of Richland, Washington (Figure 2-1). The city of Richland adjoins the southeasternmost portion of the Hanford Site boundary and is the nearest population center. In early 1943, the U.S. Army Corps of Engineers selected the Hanford Site as the location for reactor, chemical separation, and related activities for the production and purification of special nuclear materials and other nuclear activities. The mission of the Hanford Site recently has focused on waste management and environmental remediation and restoration.

Activities on the Hanford Site are centralized in numerically designated areas. The reactors are located along the Columbia River in the 100 Areas. The reactor fuel reprocessing units are in the 200 Areas, which are on a plateau approximately 7 miles (11 kilometers) from the Columbia River. The 300 Area, located adjacent to and north of Richland, contains the reactor fuel manufacturing plants and the research and development laboratories. The 400 Area, 5 miles (8 kilometers) northwest of the 300 Area, contains the Fast Flux Test Facility used for testing liquid metal reactor systems. The 600 Area covers all locations not specifically given an area designation. Adjacent to and north of Richland, the 1100 Area contains offices associated with administration, maintenance, transportation, and materials procurement and distribution. The 3000 Area, between the 1100 Area and 300 Area, contains engineering offices and administrative offices. Administrative offices also are located in the 700 Area, which is in downtown Richland.

2.2 HANFORD FACILITY DESCRIPTION

The Hanford Facility is a single *Resource Conservation and Recovery Act of 1976* (RCRA) facility, identified by the U.S. Environmental Protection Agency (EPA)/State Identification Number WA7890008967, that consists of over 60 treatment, storage, and/or disposal (TSD) units included in the *Hanford Site Dangerous Waste Part A Permit Application* (DOE-RL 1988). The Hanford Facility consists of the contiguous portion of the Hanford Site that contains these TSD units and, for the purposes of RCRA, is owned and operated by the U.S. Department of Energy (excluding lands north and east of the Columbia River, river islands, lands owned by the Bonneville Power Administration, lands leased to the Washington Public Power Supply System, and lands owned by or leased to the state of Washington).

2.3 DESCRIPTION OF 200 WEST ASH PIT DEMOLITION SITE

The Ash Pit Demolition Site is located in the eastern portion of the 200 West controlled-access area (Figure 2-2). Figure 2-3 details the layout of the Ash Pit Demolition Site.

The Ash Pit Demolition Site is situated in a multi-use borrow pit area. The entire borrow pit area is approximately 600 feet (183 meters) by 800 feet (244 meters). The floor of the borrow pit was graded sometime before the demolition activities conducted in 1984. Portions of the borrow pit have been used for a variety of other activities, including burning of tumbleweeds and soil excavation for construction material. The Ash Pit Demolition Site activities occupied only a small portion [an area 20 feet (6 meters) by 20 feet (6 meters)] of the large borrow pit, and was located away from the other activities.

The known detonation events occurred November 1984 and June 1986. The chemicals generally were placed in a shallow depression, 6 inches (15 centimeters) to 12 inches (30 centimeters) deep, dug expressly for the demolition activity. The depression was still evident at the time of demarcation. The site was staked and roped off in 1988. The demolition area has warning signs designating the area as a dangerous waste site. The area roped off is approximately 20 feet (6 meters) by 20 feet (6 meters) square. Surveyed monuments have been placed around the Ash Pit Demolition Site.

2.4 SECURITY INFORMATION

The entire Hanford Site is a controlled-access area. Access control to operational areas of the Hanford Site is expected to remain for the foreseeable future [while active institutional control is likely to continue indefinitely, for purposes of conservatism, a 100-year active institutional control period was assumed with passive controls after that time (DOE 1987)]. The Hanford Site maintains around-the-clock surveillance for the protection of government property, classified information, and special nuclear materials. The Hanford Patrol maintains a continuous presence of armed guards to provide Hanford Site security.

Manned barricades are maintained around the clock at checkpoints on vehicular access roads leading to the operational areas of the Hanford Site. All personnel accessing these areas must have a U.S. Department of Energy-issued security identification badge indicating the appropriate authorization. Personnel also might be subject to a search of items carried into or out of these areas.

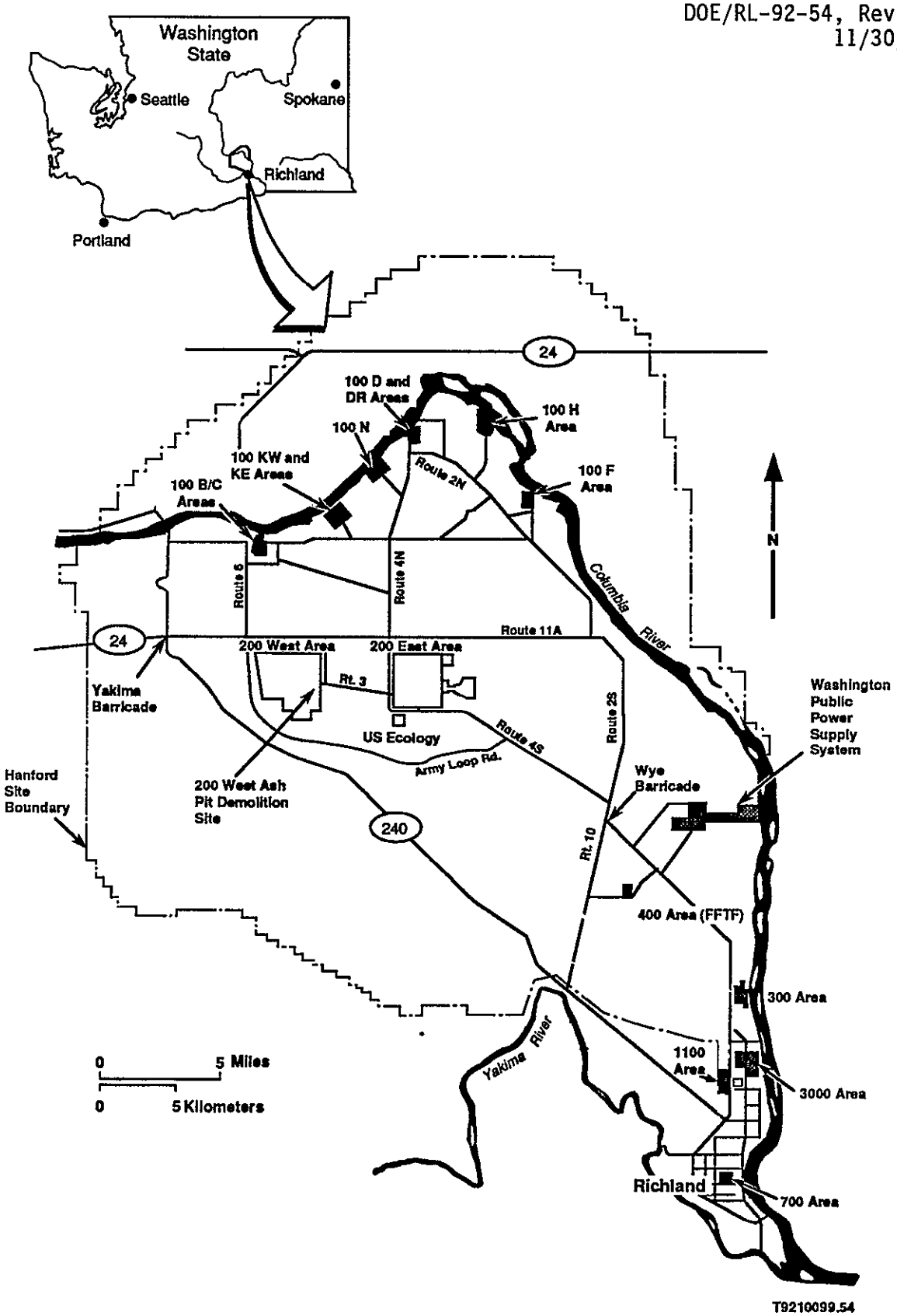

Figure 2-1. Hanford Site.

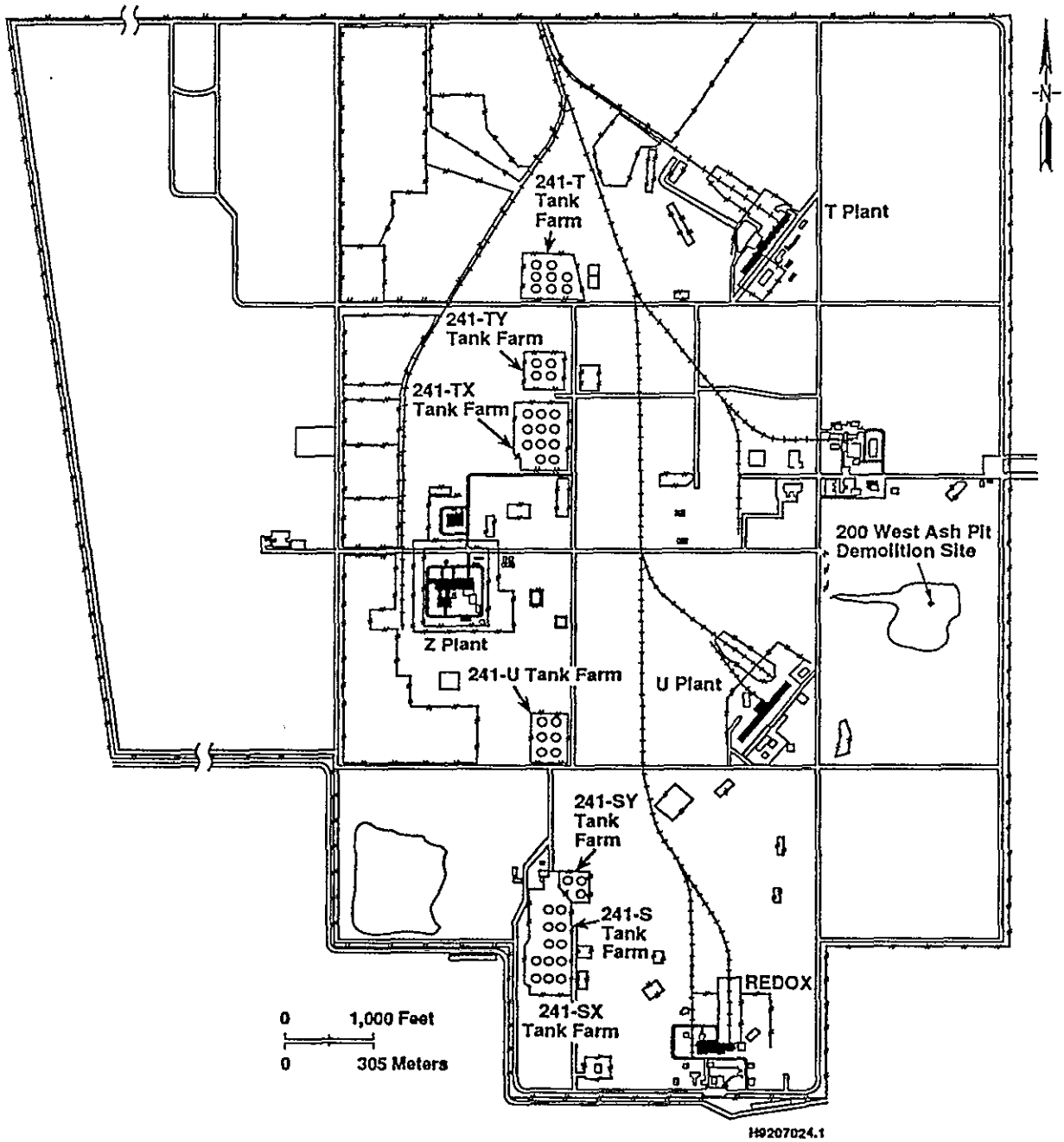

Figure 2-2. 200 West Area.

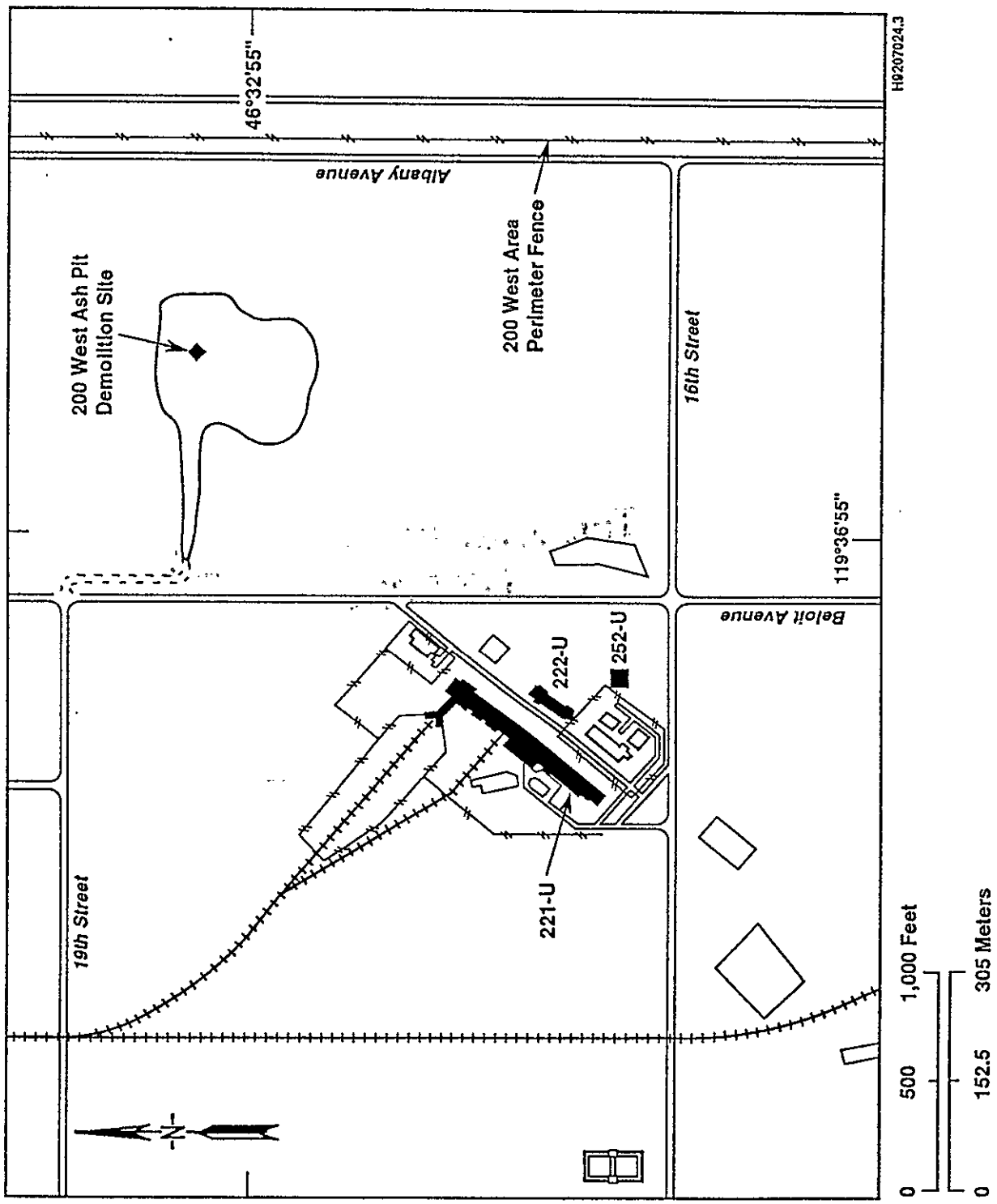

Figure 2-3. Ash Pit Demolition Site Layout.

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3.0 PROCESS INFORMATION 3-1

APPENDIX

3A PHOTOGRAPHS . . . . . APP 3A-i

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3.0 PROCESS INFORMATION

The Ash Pit Demolition Site activities were limited to two demolition events in 1984 and 1986. Photographs of the Ash Pit Demolition Site are included in Appendix 3A.

The chemicals detonated at the Ash Pit Demolition Site generally were shock-sensitive or reactive laboratory chemicals that were determined to be either in excess or beyond designated stock life. The detonation activities were limited to two events, one in November of 1984 and one in June of 1986. The two detonation events were performed at the same location. The detonations were performed during off-work hours under the observation of the Hanford Patrol, the Richland Police Department Bomb Squad, and the Hanford Fire Department. The Richland Police Department Bomb Squad provided all of the explosives and demolition material, wired the explosives, and performed all of the actual detonations. A solid waste engineering organization coordinated all of the onsite activities for the Hanford Site contractors, handled the chemicals, and placed the explosives. The Hanford Patrol provided security to prevent inadvertent intrusion by personnel not participating in the demolition activity. The Hanford Fire Department was present to render assistance in case of an accident.

Before each detonation event, a small demolition pit was excavated using a hand shovel. The discarded chemicals were placed at the bottom of the demolition pit, with the explosives situated around and on top of the chemicals. Once the blasting area was cleared, the explosives and the discarded chemicals were detonated using electric blasting caps and primer cord. Following each detonation, the solid waste engineering personnel would inspect the Ash Pit Demolition Site to ensure that the discarded chemicals were consumed by the detonation. However, at the time of these activities, no official records were kept.

Similar detonation events were conducted at the 218-E-8 Borrow Pit Demolition Site and at the Hanford Patrol Academy Demolition Sites.

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TABLE

4-1. Inventory of Known Chemicals Detonated at the 200 West Ash Pit Demolition Site T4-1

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4.0 WASTE CHARACTERISTICS

This chapter addresses the waste inventory and waste forms treated at the Ash Pit Demolition Site.

4.1 ESTIMATE OF MAXIMUM INVENTORY OF WASTE

The Ash Pit Demolition Site was a two-time use site. The demolition activities were limited to two detonation events in 1984 and 1986; hence, waste was never stored at the Ash Pit Demolition Site. The known inventory of chemicals that were detonated is listed in Table 4-1. The maximum inventory is the sum of those chemical quantities expressed in Table 4-1.

4.2 WASTE FORMS TREATED AT THE ASH PIT DEMOLITION SITE

All waste is designated in the Part A. The chemical waste treated at the Ash Pit Demolition Site was assumed to be reactive or explosive at the time of treatment.

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Table 4-1. Inventory of Known Chemicals Detonated at the 200 West Ash Pit Demolition Site. (sheet 1 of 3)

Date	Chemical identification	CAS number	Quantity (kg)	Flash point °C (°F)	Vapor pressure 20 °C mm Hg	Dangerous waste number	Information source*
Nov. 1984	benzene	71-43-2	9.47	-11 (12)	75	WT02, U019, WC01, D001, D018	E
	bis(2-chlorethoxy) ethane	112-26-5	3.28	121 (250)	0.1	WT02, WP01	D,R
	bromobenzene	108-86-1	17.29	51 (124)	5.0 @ 27.8 °C	WT02, WP01, D001	D,R
	2-butoxyethanol	111-76-2	3.28	62 (143)	0.76	WT02	D,R
	cyclohexane	110-82-7	3.61	-20 (-4)	95	U056, D001	D,R
	diisopropyl benzene	577-55-9	6.61	76.6 (170)	No data	WT02	D,R
	1, 4 dioxane	123-91-1	4.69	12 (54)	27	WT02, U108, WC01, D001	D,R
	ethylene glycol monoethyl ether	110-80-5	1.05	42 (108)	3.8	WT02, D001	D,R
	glycerin	56-81-5	7.52	160 (320)	.0025 @ 50 °C	Nonregulated	D, #
	naphtha	8030-30-6	1.17	-50 (-57)	40	D001	D,R
	nitromethane	75-52-5	3.94	35 (95)	27.8	WT02, D001, D003	D,R
	tetrahydrofuran	109-99-9	15.79	-14 (6)	145	WT02, U213, D001	D,R
	tetrahydronaphthalene	119-64-2	6.58	71 (160)	1.0 @ 38 °C	WT02	D,R
June 1986	acrolein	107-02-8	0.4	-17 (-2)	220	WT01, P003	D,R
	aluminum chloride	7446-70-0	0.45	Not flammable	1.0 @ 100 °C	WT02, D002, D003	D,R
	2-butoxyethanol	111-76-2	0.95	62 (143)	0.76	WT02	D,R
	chromium metal powder	7440-47-3	0.45	No data	1.0 @ 1616 °C	D007	D,R
	dimethyl hydrazine	57-14-7	0.01	-15 (5)	157 @ 25 °C	WT02, U098, WC01, D001	D,R
	ethyl ether	60-29-7	28	-45	442	WT02, U117, D001	D,R
	hydrazine	302-01-2	1	38 (100)	10.4	WT02, U133, WC01, D001, D002, D003	D,R
	isopropyl ether	108-20-3	1	-28 (-18)	130	WT02, D001	D,R
	lithium hydride	7580-67-8	0.23	No data	0	D001, D003	D,R

Table 4-1. Inventory of Known Chemicals Detonated at the 200 West Ash Pit Demolition Site. (sheet 2 of 3)

	Date	Chemical identification	CAS number	Quantity (kg)	Flash point °C (°F)	Vapor pressure 20 °C mm Hg	Dangerous waste number	Information source*
1		p-nitrobenzoyl chloride	122-04-3	0.1	No data	Negligible	Nonregulated	D,R
2		phenyl ether	101-84-8	0.24	115 (239)	.02 @ 25 °C	WT02, D001	D,R
3		picric acid	88-89-1	0.2	150	1	D003	D,R
4		picryl chloride	88-88-0	0.3	No data	No data	D003	D,R
5		sodium peroxide	1313-60-6	0.34	No data	No data	D001, D003	D,R
6		tetrahydrofuran	109-99-9	6.1	'-14 (6)	145	WT02, U213, D001	D,R
7		triethylborane in hexane	97-94-9	0.5	35.5 (-32)	No data	WT02, D001, D003	D,R
8		benzene (20%)	71-43-2	Total amt. 5.0	'-11 (12)	75	WT02, U019, WC01, D001, D018	D,R
9		ethyl acetate (20%)	141-78-6		'-4	73	U112, D001, D003	
10		ethyl ether (10%)	60-29-7		'-45	442	WT02, U117, D001	
11		hydrogen sulfide (1.0%)	7783-06-4		No data	15200 @ 25 °C	U135, D001	
12		methanol (29%)	67-56-1		11 (52)	97.25	WT02, U154, D001	
13		tetrahydrofuran (10%)	109-99-9		'-14 (6)	145	WT02, U213, D001	
14		toluene (10%)	108-88-3		4 (40)	22	WT02, U220, D001	
15		benzene	71-43-2	Total amt. 4.0	'-11 (12)	75	WT02, U019, WC01, D001, D018	D,R
16		ethyl acetate	141-78-6		7.2	73	U112, D001, D003	
17		ethyl ether	60-29-7		'-45	442	WT02, U117, D001	
18		petroleum ether	8032-32-4		0.0 (32)	No data	D001	
19		toluene	108-88-3		16	22	WT02, U220, D001	
20		di-ethyl ether (50%)	60-29-7	Total amt. 4.0	'-45 (-49)	442	WT02, U117, D001	
21		heptane (50%)	142-82-5		'-4 (25)	40	D001	
22		allyl magnesium bromide (22%)	1730-25-2	Total amt. 1.0	No data	No data	No data	

Table 4-1. Inventory of Known Chemicals Detonated at the 200 West Ash Pit Demolition Site. (sheet 3 of 3)

	Date	Chemical identification	CAS number	Quantity (kg)	Flash point °C (°F)	Vapor pressure 20 °C mm Hg	Dangerous waste number	Information source*
1		ethyl ether (78%)	60-29-7		'-45 (-49)	442	WT02, U117, D001	
2		benzene	71-43-2	Total amt. 1.0	'-11 (12)	75	WT02, U019, WC01, D001, D018	
3		butyllithium	109-72-8		(-1.0)	No data	D001, D003	
4		hexane	110-54-3		'-22.7 (-9)	124	D001	D,R
5		tetrahydrofuran	109-99-9		'-14 (6)	145	WT02, U213, D001	

*D = TSD facility annual dangerous waste reports.
R = Waste tracking records prepared from miscellaneous records.
E = environmental protection surveillance and compliance inspection.
CAS = Chemical Abstract System registry numbers.
Hg = mercury.
kg = kilogram.
mm = millimeter.
°C = degree Centigrade.
°F = degree Fahrenheit.

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5.0 GROUNDWATER MONITORING 5-1

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5.0 GROUNDWATER MONITORING

In accordance with the Tri-Party Agreement groundwater in the 200 West Area will be included in the 200-UP-1 groundwater operable unit and will be investigated under the CERCLA remedial investigation/feasibility study process. Therefore, groundwater monitoring is not addressed as part of the Ash Pit Demolition Site closure plan. Work on the 200-UP-1 groundwater operable unit is scheduled to begin in fiscal year 1993.

In addition, it is considered extremely unlikely that the demolition site chemicals interacted with groundwater because (1) rainfall at the Hanford Site is slight, thus limiting contaminant migration, and (2) it is believed that all significant quantities of chemicals were destroyed in the explosion or volatilized to the atmosphere.

The remedial action objectives for this operable unit will be based on the following general objectives.

- Protecting human health by ensuring that applicable or relevant and appropriate requirements will not be exceeded and health risks, as determined through analysis of all exposure pathways, will be kept at or below acceptable limits.

- Ensuring acceptably low risks to the environment, such as Columbia River biota.

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CONTENTS

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6.2 CLOSURE PERFORMANCE STANDARDS 6-2
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6.3 CLOSURE ACTIVITIES 6-3

FIGURE

6-1. Closure Strategy Flowchart F6-1

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6.0 CLOSURE STRATEGY AND PERFORMANCE STANDARDS

This chapter describes the closure strategy, closure performance standards, and closure activities.

6.1 CLOSURE STRATEGY

The closure investigation began by performing a radiation survey at the Ash Pit Demolition Site. The results of the radiation survey confirmed that there is no radioactivity above background at the Ash Pit Demolition Site. Any radiation above background levels at the Ash Pit Demolition Site would have been from activities other than Ash Pit Demolition Site activities.

Soil samples will be taken at and adjacent to the Ash Pit Demolition Site and analyzed as described in Chapter 7.0. The analytical results will be evaluated and compared with action levels for constituents of concern to determine the extent of contamination. The basis for determining chemical ownership is the list of analytes of interest found in Chapter 7.0, Table 7-1, that takes into account the waste inventory, reactive byproducts, and chemical degradation. Only analytes listed in Table 7-1 are traceable to the Ash Pit Demolition Site activities. If at any time an imminent hazard is posed at the Ash Pit Demolition Site, an expedited response will result to ensure worker safety.

Action levels are concentrations of analytes of interest that prompt an action, such as soil removal/treatment or further evaluation. Initial action levels will be the greater of two levels: background or limit of quantitation. Background will be Site-wide background threshold values as defined in *Hanford Site Soil Background* (DOE/RL 1992a). The limit of quantitation is the level above which quantitative analysis can be obtained with a specific degree of confidence (generally the mean background signal plus 10 standard deviations). If concentrations exceed initial action levels, health-based action levels will be assessed.

The health-based levels will be based on equations and exposure assumptions presented in the *Hanford Site Baseline Risk Assessment Methodology* (DOE/RL 1992b). For noncarcinogens, the principal variable relating human health to action levels is the oral reference dose, and the oral reference dose is defined as the level of daily human exposure at or below which no adverse effect is expected to occur during a lifetime. For carcinogens, the cancer slope factor is the basis for determining human health effects; it is measurement of risk per unit dose. The oral reference dose and cancer slope factor are chemical specific and are obtained from the *Integrated Risk Information System* (EPA 1991), a database that is updated periodically by the EPA. Health-based levels will be based on values that are current at the time of approval of this closure plan.

If action levels are exceeded, follow-up activities could include such things as limited soil removal or coordination of soil remediation with the

CERCLA cleanup process. The closure strategy for the Ash Pit Demolition Site is depicted in a flow diagram in Figure 6-1.

6.2 CLOSURE PERFORMANCE STANDARDS

The closure performance standards in WAC 173-303-610(2) require the owner or operator to close the TSD unit in a manner that:

"(a)(i) Minimizes the need for further maintenance;

(ii) Controls, minimizes or eliminates to the extent necessary to protect human health and the environment, postclosure escape of dangerous waste, dangerous constituents, leachate, contaminated run-off, or dangerous waste decomposition products to the ground, surface water, ground water, or the atmosphere; and

(iii) Returns the land to the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity."

6.2.1 Minimize the Need for Future Maintenance

The closure performance standard in WAC 173-303-610(2)(a)(i) requires the owner or operator of a TSD unit to close the site in a manner that minimizes the need for further maintenance. As discussed in Section 6.1, the strategy proposed for closure (i.e., that the site is clean by demonstration that the contaminants are below action levels or waste removal) will minimize the need for future maintenance.

6.2.2 Protect Human Health and the Environment

The Ash Pit Demolition Site is to be closed. Consistent with this intent and strategy, the following actions will be/or have been taken (as necessary) in advance of closure certification.

- The closure area was radiologically surveyed.
- Surface soils will be sampled for dangerous waste constituents.
- If necessary, contaminated soil will be removed to reduce constituent concentrations in site surface soils to acceptable soil cleanup values as determined by methods prescribed in WAC 173-340 and implemented by the *Hanford Site Baseline Risk Assessment Methodology* (DOE-RL 1992a).

6.2.3 Return Land to the Appearance and Use of Surrounding Land

In accordance with WAC 173-303-610(2)(a)(iii), the owner or operator of a TSD unit is required to close the unit in a manner that returns the land to

the appearance and use of surrounding land areas to the degree possible given the nature of the previous dangerous waste activity.

When closure of the Ash Pit Demolition Site is accomplished, the site will be returned to the appearance and continued use of the surrounding 200 West Ash Pit Demolition Site, in accordance with WAC 173-303-610(2)(a)(iii).

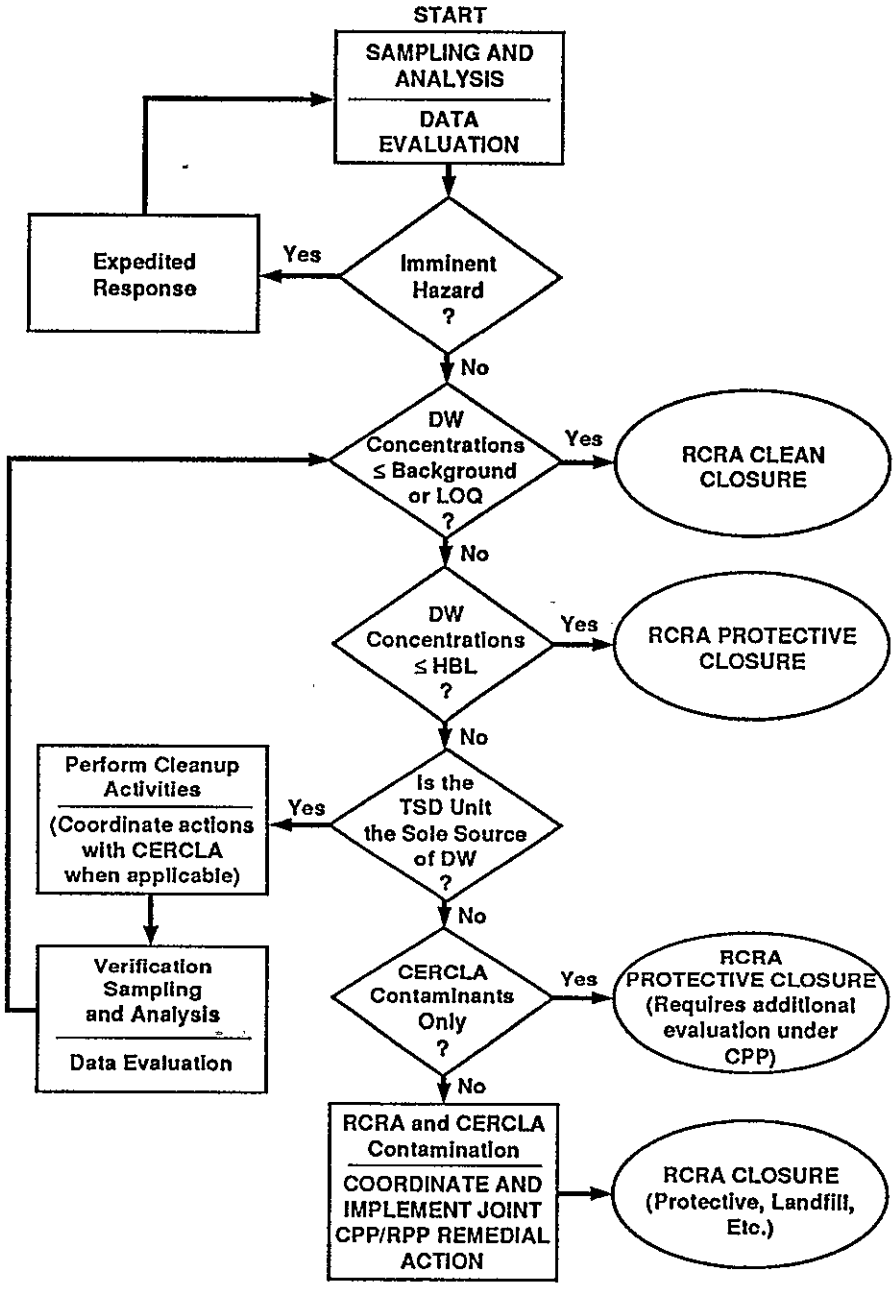
6.3 CLOSURE ACTIVITIES

The general closure activities are as follows.

- Perform radiological survey.
- Collect soil samples from within the Ash Pit Demolition Site and from surrounding soils. Sample locations and collection methods are discussed in Chapter 7.0, Section 7.2.3.
- Analyze samples in accordance with EPA-approved procedures and evaluate analysis results. Samples will be analyzed in an onsite mobile laboratory capable of performing to EPA Analytical level III standards.
- Compare analysis results to action levels to determine the extent of contamination to determine the presence or absence of contaminants or to facilitate decisions concerning remediation.
- If contamination levels for all constituents of concern listed in Chapter 7.0, Table 7-1, are below the action level, the Ash Pit Demolition Site will be closed.
- If contamination at the Ash Pit Demolition Site is above the action level in the near-surface soils, one of the following actions will be taken. (The action level for the Ash Pit Demolition Site is when contamination is above both background concentrations and health-based standards.)
  - If the contamination is from Ash Pit Demolition Site activities only, soil will be treated and/or disposed of in a RCRA-compliant landfill.
  - If the soil is contaminated with dangerous waste constituents from other sources in addition to Ash Pit Demolition Site activities, the soil will be remediated in coordination with CERCLA activities.
  - If the soil is contaminated from sources other than Ash Pit Demolition Site activities, the site will no longer be a RCRA site, and remediation will occur under CERCLA as part of 200-SS-2 operable unit.

All equipment used in performing closure activities will be decontaminated or disposed of at a RCRA-compliant facility.

Closure activities will be monitored by an independent registered professional engineer who will certify that closure activities are accomplished in accordance with the specifications of the approved closure plan. The certification will be sent by registered mail or an equivalent delivery service.



Background = Hanford Site-wide background threshold (upper limit range of concentrations) for soil (DOE-RL 1992b).
Clean Closure = Closure based on the criterion that dangerous waste is not present in concentrations greater than background or LOQ; no further remedial action to be taken.
CPP/RPP = CERCLA past practice/RCRA past practice.
DW = Dangerous waste as defined in WAC 173-303.
HBL = Health-based levels.
LOQ = Limit of quantitation; the level above which quantitative analysis can be obtained with a specified degree of confidence; generally $10\sigma \pm 3\sigma$.
Protective Closure = Closure based on the criterion that dangerous waste concentrations are less than or equal to HBL; no further remedial action to be taken.
Verification Sampling = Sampling and analysis used to evaluate the success of contamination removal.

Figure 6-1. Closure Strategy Flowchart.

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TABLE

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7.0 CLOSURE ACTIVITIES

This chapter describes the proposed closure activities for the Ash Pit Demolition Site. In conformance with Chapter 6.0, this chapter provides specific field sampling and laboratory analytical procedures that will be applied to identify the soil contamination (if any) that originated at the Ash Pit Demolition Site. When validated, the analytical results will be used to determine the appropriate closure strategy (as presented in Chapter 6.0 and illustrated in Figure 6-1). The soil sampling and analysis plan (Section 7.2) has been developed from the process information (Chapter 3.0), waste inventory (Chapter 4.0), and the closure strategy (Chapter 6.0). Appendix 7A contains the quality assurance project plan for the sampling and analysis plan.

7.1 SITE RADIOLOGICAL SURVEY

A radiological survey of the Ash Pit Demolition Site was performed to confirm that the site is substantially free of radiological contaminants [i.e., that radiological activity in surface soils is below levels requiring (1) management of the area as a radiologically contaminated site, (2) control of work at the site by the radiation work permit process, or (3) wearing of prescribed protective clothing and/or respiratory protection].

7.2 SOIL SAMPLING AND ANALYSIS

Soil samples will be collected and analyzed in an onsite mobile analytical laboratory to assess whether dangerous waste constituents are present in surface soils at the Ash Pit Demolition Site. If the onsite mobile laboratory is not available, analytical level III services will be procured from another laboratory. If contaminants are present at levels in excess of proposed action levels, the data obtained from soil sampling and analysis (possibly supplemented by data obtained with portable field screening instrumentation) will provide adequate information for devising and implementing appropriate remedial action.

7.2.1 Sampling and Data Quality Objectives

To create a suitable soil sampling and analysis scheme, it is necessary to have a general understanding of explosives and detonations. An explosive is a chemical or a mixture of chemicals that is capable of producing an explosion (i.e., detonation) through the liberation of stored energy. All explosive substances produce heat; nearly all of them produce gas (Davis 1943). Explosives are classified into low explosives (or propellants), primary explosives (or initiators), and high explosives. Low explosives are combustible materials, which always include an oxidizer component, such that combustion is supportable whether or not air is present. Low explosives (themselves) burn but do not explode. Rapid accumulation of the gas products of combustion in a confined space is the actual cause of the explosion. With primary and high explosives, the materials themselves actually undergo an

instantaneous chemical transformation when detonation is initiated, which liberates large quantities of heat or heat and gas, thus producing an explosion. Detonation is distinct from combustion. By themselves, many primary and highly explosives will not support combustion. Primary explosives are sensitive to both heat and shock. High explosives generally exhibit sensitivity to shock only, and generally must receive a relatively strong shock, as from a primary explosive, to detonate. Primary and high explosives are characterized by a property termed brisance, referring to the production of a shock wave during detonation, due to the characteristically high propagation velocities involved.

Chemicals that were identified as candidates for demolition at the Ash Pit Demolition Site included strong oxidizers and reducing agents (i.e., low explosives when combined), chemicals such as ethers and furans that are highly flammable and form shock-sensitive degradation products, and chemical compounds that were recognized as primary or high explosives or chemical cognates of such explosives.

The Ash Pit Demolition Site demolition events could be characterized as follows.

- Initiation by a primary explosive, resulting in propagation of a shock wave through the mass of chemical containers. The shock wave would have caused any other primary or high explosive chemicals present to detonate.

- Nonexplosive chemicals would be dispersed (in the case of solids) or atomized (in the case of liquids), directed upward (the only unconfined direction) by the partial confinement of the shallow pit, and ignited by the heat released by the explosion, causing the fireball. The explosion also could have had the effect of ionizing (fragmenting) some of the chemicals that were present.

- The shock wave from the explosion and the expanding gases from the fireball would have caused unreacted residues (if any) to be dispersed over an unspecified area.

Some chemicals residues can remain in the surface soil for many years. However, in the intervening time since the most recent demolition event took place, volatile organic residues in the soil might have been lost to the atmosphere by vaporization. Unreacted volatiles and semivolatiles also might have been eliminated from the soil column, all or in part, by microbial activity.

The primary objective of soil sampling will be to determine whether dangerous waste contaminants are present in surface soils at the Ash Pit Demolition Site at levels exceeding the proposed action levels. Potential contaminants (i.e., analytes of interest) for sample analysis can be distinguished based on the waste inventory constituent list for the Ash Pit Demolition Site. Analytical methods are required that provide the capabilities to identify and quantitate these constituents if the constituents are present in the soil.

If dangerous waste constituents are present at or above proposed action levels, a second objective of sampling will be to determine the extent and areal distribution of contamination. The efficiency of thermal destruction during the demolition events is not directly assessable at this late date. Any chemical constituents that were not effectively destroyed in the explosion might simply have been dispersed across the detonation site. Recognizing this possibility, the sampling scheme has been designed to obtain data that will, if necessary, support an assessment regarding the adequacy of existing Ash Pit Demolition Site closure area dimensions.

It is generally acknowledged that detonation and thermal destruction are very efficient processes, and that any dangerous waste constituents that might remain in the soil at the closure area probably would exist at very low concentrations, such that detection might be difficult. Therefore, a sufficiently conservative EPA analytical support level (level III) will be invoked during initial sampling and analysis to minimize concerns that dangerous waste concentrations above the proposed action levels could go undetected. Followup sampling (as needed) might be carried out with portable field screening instruments (level I or II) to determine the areal extent and distribution of any contamination when, and if, it is determined that a reduced level of analytical support is justifiable and consistent with the overall data quality objectives of the project.

Data quality objectives are developed to describe the overall level of uncertainty in environmental data that decision-makers are willing to accept. Typically, data quality requirements are specified in terms of objectives for precision, accuracy, representativeness, comparability, and completeness. Project-specific data quality objectives for Ash Pit Demolition Site soil sampling activities are identified in Section 7A.3 of Appendix 7A.

7.2.2 Analytical Parameters

As indicated in Chapter 4.0, Table 4-1, the detonation events at the Ash Pit Demolition Site included a variety of organic and inorganic constituents that were (or were suspected to be) characteristic ignitable, corrosive, and/or reactive waste (as defined in WAC 173-303-090). The majority of the chemical compounds were of two general types: (1) organic chemicals that form unstable degradation products (e.g., ethers and furans that produce shock-sensitive peroxides); and (2) reactive powdered metals and metal salts.

Analytes of interest for soil sampling are listed in Table 7-1, together with proposed analytical methods for quantification. The organic analytes include one target compound list (TCL) compound: methyl ethyl ketone. For TCL compounds, gas chromatograph/mass spectrometer devices are calibrated to perform both identification and quantitation functions. Other volatile and semivolatile organics can be identified, but the gas chromatograph/mass spectrometer system lacks the calibration information to perform quantitation. These other volatile and semivolatile compounds are referred to as 'tentatively identified compounds' (TIC)s. Quantitative analyses of TICs can be performed with the gas chromatograph/mass spectrometer. However, the device must be calibrated separately for each TIC analyte of interest. To do

so requires either onsite preparation or acquisition from a commercial supplier of individual calibration standards for each TIC.

Direct quantitation will be performed for methyl ethyl ketone. For the TICs listed in Table 7-1, the following analytical strategy is proposed. Initially, samples will be analyzed qualitatively by gas chromatograph/mass spectrometer and by separate gas chromatograph units with multiple detectors that provide enhanced sensitivity for various classes of organics. If qualitative analyses indicate that one or more TICs are present in detectable concentrations, calibration standards will be prepared or procured to facilitate quantitation of these compounds.

Two of the volatile organics listed as TICs in Table 7-1 (acrolein and dioxane) are difficult to quantitate by purge and trap-gas chromatograph/mass spectrometer because they exhibit poor purging characteristics in the apparatus. For these analytes, purge and trap-gas chromatograph/mass spectrometer will be used for qualitative analysis only. If they are detected, quantitation will be carried out by an alternative method, such as SW-846 method 8030 for acrolein and/or SW-846 method 8015 for dioxane (EPA 1990b).

Polar (i.e., water soluble) organic analytes of interest will be analyzed by aqueous extraction from soil followed by direct aqueous injection into a gas chromatograph with multiple detectors. To prepare for quantitative analysis, it will be necessary to procure calibration standard solutions containing the analytes of interest.

Table 7-1 includes only one inorganic analyte, chromium. Total chromium will be analyzed by x-ray fluorescence. If chromium concentrations are sufficiently high to warrant doing so (i.e., if concentrations are within an order of magnitude of the proposed action level for chromium), separate analysis for Cr^{6+} by ion chromatography will also be performed.

Several waste inventory constituents identified in Chapter 4.0 do not appear in Table 7-1. The rationale for modifications and deletions to the analyte list are discussed as follows.

- Several inventory constituents would have reacted immediately on contact with any available oxygen and/or moisture in the air or the soil. Such constituents would include hydrazine, dimethyl-hydrazine, triethyl borane, allyl magnesium bromide, and p-nitro-benzoyl chloride.

- Hydrazine and dimethylhydrazine are strong reducing agents (Merck 1989; Sax and Lewis 1987; and Aldrich 1986) and would have been destroyed.

- Triethyl borane would have undergone immediate oxidation (Sax and Lewis 1987; Aldrich 1986). Boric oxide dust suspended in air might represent a respiratory hazard (threshold limit value = 10 milligrams per cubic meter) (Sax and Lewis 1987). However,

boric oxide in soil appears to pose no specific environmental concern. Boric oxide is not a listed waste in WAC 173-303-9905.

- Allyl alcohol and p-nitrobenzoic acid are the expected degradation products of allyl magnesium bromide and p-nitrobenzoyl chloride respectively. The degradation products are identified as corresponding analytes of interest in Table 7-1.

- Glycerin is a listed inventory constituent. However, glycerin was not carried forward as an analyte of interest because it is not a listed or characteristic waste.

- Aluminum chloride in the anhydrous form is toxic and reactive (Merck 1989; Sax and Lewis 1987). However, any residual unreacted $AlCl_3$ in soil would be in either the hydrated or ionic form, which are environmentally benign. Hydrogen sulfide was present as a 1 percent constituent in approximately 11 pounds (5 kilograms) of mixed organic solvents. Hydrogen sulfide exhibits a relatively low boiling point [-142 °F (-61 °C)] and very high vapor pressure (greater than 15,000 millimeters per mercury) characteristics. Given the small initial quantity, the volatility and flammability characteristics, and the mode of disposal, it is considered highly unlikely that this compound could be present in identifiable concentrations in soils at the site. Lithium hydride is a strong reducing agent that is pyrophoric and reactive with water (Merck 1989; Sax and Lewis 1987; and Aldrich 1986). It is infeasible that LiH could persist in soils in unreacted form. The reaction products, Li^+ and OH^- ions, are environmentally benign. Sodium peroxide is corrosive and reactive with water (Merck 1989; Sax and Lewis 1987; and Aldrich 1986). Any residual sodium peroxide in soil following demolition events would react with soil moisture to form sodium hydroxide, which is environmentally benign in trace quantities. Based on the foregoing assessments, aluminum chloride, hydrogen sulfide, lithium hydride, and sodium peroxide were excluded from Table 7-1 as analytes of interest.

7.2.3 Sampling Methodology

The following sections discuss sample locations, background samples, and analytical instrumentation and procedures.

7.2.3.1 Sample Locations. At a minimum, soil samples will be taken from the 11 locations indicated in Figure 7-1. The minimum numbers and types of samples to be collected and submitted for analysis will consist of the following:

- One authoritative sample will be collected at the site center

- Five samples will be collected from predetermined random locations within the site boundary. A random number algorithm was used to select these locations

- Five samples will be collected from locations outside the site boundary. These locations also were selected with the aid of a random number algorithm

- Surface samples will be collected from two of the 11 locations

- Two samples will be split in the field, placed in separate containers, and submitted as duplicates for quality assurance and quality control purposes

- Three blanks, consisting of an equipment blank, a field blank, and a trip blank, will be collected and submitted for analysis with the soil samples and splits. Blanks will consist of pure silica sand.

Soil samples will be removed from the specified locations for qualitative and quantitative analyses in an onsite mobile laboratory. Sampling will be performed in conformance with EII 5.2, Appendix E (WHC 1988a). Samples will be collected manually, using decontaminated, stainless steel hand tools. At each location to be sampled, the uppermost 6 inches (15 centimeters) of soil will be removed. Samples will be taken from the interval 6 to 18 inches (15 to 46 centimeters) below grade. Chemical residues from the demolition events would have been deposited at the surface of the soil column. Over time, the soluble constituents would have undergone gradual removal by successive wetting fronts (from rainfall and snowmelt events), and redeposited lower in the soil profile. With the proposed sampling approach, leachable or otherwise mobile constituents that might have been reduced to concentrations below detectable levels at the soil surface could still be detected below grade. If volatile organics remain in the site soils, they should be more readily detectable at shallow depths below the soil surface, rather than at the surface itself. Two additional samples will be collected from the 0- to 6-inch (0- to 15-centimeter) interval at the locations shown in Figure 7-1 to verify that contaminants do not persist as insoluble or immobile residues at the soil surface.

All soil samples (including blanks and duplicates) will receive preassigned sample numbers in conformance with EII 5.10, "Obtaining Sample Identification Numbers and Accessing Hanford Environmental Information System (HEIS) Data" (WHC 1988a). The sample volume required for each soil sample will be 2 pounds (1.0 kilogram) [4 pounds (2.0 kilograms) for samples that will be split]. The samples will be chilled with ice. Samples will be stored temporarily and transported to the analytical laboratory in an ice chest. Recommended holding time limits for samples are listed by analyte/analytical method in Table 7-1.

7.2.3.2 Background Samples. A Hanford Site-wide assessment of natural constituent background levels has been performed for the Hanford Site

(WHC 1991a; WHC 1991b). The majority of dangerous waste constituents detonated at the site were organic chemicals, for which background values will be assumed to be negligibly small. For these constituents, concentration data will be compared to respective laboratory quantitation limits rather than background. A few compounds on the waste inventory list contained inorganic metal and halide elements. Residues from these compounds could include oxides, metal cations, and/or various anions with non-zero background values. Results from the Hanford Site-wide assessment will be available for use in data interpretation. No independent assessment of local background values is planned to support closure. The adequacy of available Hanford Site-wide background data for site-specific contaminants will be evaluated in conjunction with the interpretation of soil sample analytical results. Additional soil sampling to evaluate local background could be performed if necessary.

7.2.4 Analytical Instrumentation and Procedures

The onsite mobile laboratory will be equipped with the following principal analytical instrumentation:

- Gas chromatograph (GC) - configured for multiple detectors as follows:
  - Photoionization detector (PID) - screening for aromatics, unsaturated aliphatic compounds, chlorinated solvents
  - Flame ionization detector (FID) - screening for volatile organic compounds
  - Electron capture detector (ECD) - screening for halogenated compounds, pesticides, polynuclear aromatic hydrocarbons, and other semivolatiles
- Gas chromatograph/mass spectrometer (GC/MS) - quantitative analyses of volatile, semivolatile and nonvolatile organic compounds. The gas chromatograph/mass spectrometer analyses will be supported by the following concentration/extraction systems:
  - Purge and trap unit - extraction of volatile organic compounds
  - Supercritical fluid extraction (SFE) unit - extraction of semivolatile and nonvolatile organics
- X-Ray fluorescence (XRF) spectrometer - screening and quantitative analyses for metals.
- Ion chromatograph (IC) - quantitative analyses for cations and anions.

The onsite mobile laboratory gas chromatograph unit is specifically configured for operation of multiple detectors (i.e., photoionization detector, flame ionization detector, and electron capture detector) in series. This series configuration will be used to screen for organics in advance of

quantitative analysis by gas chromatograph/mass spectrometer. Specified method detection limits for the photoionization detector, flame ionization detector, and electron capture detector units are 100 micrograms per kilogram (parts per billion) (soil). Procedures for calibration, standardization, and maintenance of the gas chromatograph photoionization detector, flame ionization detector, and electron capture detector system will be based on onsite mobile laboratory procedures, and published EPA methods.

Procedures for calibration, standardization, and maintenance of the gas chromatograph/mass spectrometer system and associated extraction systems will be based on the following published methods:

For volatile organics:

- SW-846 Method 5030--Sample preparation by the purge and trap method
- SW-846 Method 8240--Volatile organic compounds by gas chromatograph/mass spectrometer: packed column technique
- SW-846 Method 8260--Volatile organic compounds by gas chromatograph/mass spectrometer: capillary technique

For semivolatile organics:

- SW-846 Method 8250--Semivolatile organic compounds by gas chromatograph/mass spectrometer: packed column technique
- SW-846 Method 8270--Semivolatile organic compounds by gas chromatograph/mass spectrometer: capillary technique.

The EPA has not formally approved a supercritical fluid extraction procedure for gas chromatograph/mass spectrometer determinations. A draft method currently is under review (EPA 1991). Procedures for the onsite mobile laboratory will be based on procedural guidance from the instrument manufacturer. The specified method detection limit for the gas chromatograph/mass spectrometer system for volatiles is 10 micrograms per liter.

The x-ray fluorescence technique is a rapid-turnaround, nondestructive test method for metals (specifically, metals with atomic numbers greater than 11). The onsite mobile laboratory x-ray fluorescence system configuration will include vacuum pump, power source, soil grinder, sample preparation materials, and metal standards. The onsite mobile laboratory procedure will reference Method FM-2 (EPA 1988). Specified detection limits for target metals specifically regulated under the National Pollution Discharge Elimination System, RCRA, and the *Clean Water Act of 1977* will be 20 micrograms per gram.

Onsite mobile laboratory analyses for Na^{+}, NH_4^{+}, K^{+}, Mg^{++}, Ca^{++}, Cr^{+6}, NO_3^{-}, NO_2^{-}, Cl^{-}, F^{-}, Br^{-}, SO_4^{--}, HPO_4^{--}, and CN^{-} will be performed by ion chromatography methods. Specified detection limits for CN^{-} and Cr^{+6} are 10 micrograms per liter. Specified detection limits for other listed ions are

20 micrograms per milliliter. Ion chromatographic analyses will be performed according to EPA Method 300.0 for anions (excluding CN^-), Method 300.7 for cations (excluding Cr^{+6}), Method 218.6 for Cr^{+6}, and Method 353.2 for nitrogen, NO_3^- and NO_2^- (EPA 1979). There currently is no EPA approved method for CN^- by ion chromatography. Determinations for CN^- will follow the recommended method from the ion chromatography system manufacturer.

The onsite mobile laboratory will be equipped with auxiliary instrumentation for determining sample mass, pH, electrical conductivity, and CO_2/CO_3 content.

7.2.5 Quality Assurance and Quality Control

This section summarizes the quality assurance and quality control components and procedures that will be imposed on the onsite mobile laboratory operation and the documentation that will be generated along with the analytical data to ensure that the data will be acceptable.

The objective of the onsite mobile laboratory procurement is to provide onsite, quick-turnaround screening capabilities for samples of contaminated media equivalent to analytical level III. To ensure that the basic character of analytical expedience of the mobile laboratory will not be compromised, analytical quality assurance and quality control will be limited to procedures and protocols that are appropriate for production of analytical level III data.

The following quality assurance requirements will be imposed on all analytical work performed by the mobile laboratory.

- **Duplicate samples:** Duplicate samples will be included for analysis with each batch of samples. In this context, a batch of samples refers to a group of samples collected during one sampling event by a single method. Duplicate samples will be placed in separate containers and assigned separate numbers in the field (for field quality assurance purposes) or will be prepared in the laboratory by dividing (splitting) an individual sample (for laboratory quality control purposes).

- **Method check samples:** A check sample will be analyzed with each batch of samples. The check sample will contain a representative subset of the constituents to be determined by each prescribed analytical method. Check samples will be prepared with constituent concentrations approaching the limit of quantification as a means of continuously monitoring the accuracy and precision of the various analytical methods.

- **Column check standards:** Each batch of adsorbents used in chromatographic analysis will be checked for constituent recovery by running the elution pattern with standards as a column check. The elution pattern will be optimized for maximum recovery of constituents and maximum rejection of contaminants.

- **Instrument calibration:** Analytical instrumentation will be maintained in tuned, aligned, and/or calibrated condition consistent with applicable requirements specified in the onsite mobile laboratory's analytical procedures and/or calibration schedules. Calibration records will be maintained for all onsite mobile laboratory measurement and test equipment.

- **Reagent blanks:** A reagent blank will be carried through each analytical procedure with each batch of samples.

- **Additional quality assurance and quality control requirements for gas chromatograph/mass spectrometer analyses:** Instrument calibration status will be checked once each operating day or at the beginning of each 12-hour period of operation. Calibration will be verified by comparing the response at specified frequencies against a standard curve. For use in determinations of volatile organics, gas chromatograph/mass spectrometer response will be checked with 4-bromofluorobenzene. For semivolatiles, decafluorotriphenylphosphine will be used as the check standard. If the instrument response is out of specification for any ion species identified in the ion abundance criteria in the analytical procedure, the instrument will be recalibrated and rechecked before any additional analyses are performed.

- **Additional quality assurance and quality control requirements for x-ray fluorescence analyses:** Additional quality assurance and quality control will be required for x-ray fluorescence analyses because of the nature of the technique and the small mass of sample used to perform the analysis. Frequent analyses of duplicate samples are necessary to monitor both sample homogeneity and analytical precision. At least one duplicate sample will be analyzed per 20 samples or per sample lot, whichever is greater. Precision will be evaluated by computing the relative percent difference between the results from duplicate samples x_1 and x_2. The relative percent difference is computed as follows:

$$RPD = 100 \bullet \frac{|x_1 - x_2|}{\bar{x}}$$

where $\bar{x}$ is the mean of x_1 and x_2. Acceptance criteria for relative percent difference will be defined in operating procedures for quality control purposes. If results for a given element fall outside this limit, the data will be flagged and x-ray fluorescence analyses suspended until the problem has been diagnosed and corrected. Diagnostic steps will include analyzing additional splits or duplicates to evaluate sample homogeneity and rerunning calibration standards to evaluate the performance of the x-ray fluorescence relative to specifications. Calibration standards will include National Institute of Standards and Technology reference metals specimens and check standards containing a mixture of metal constituents.

- **Additional quality assurance and quality control requirements for ion chromatography analyses:** Additional quality assurance and quality control requirements for ion chromatography analysis are prescribed in EPA/600/4-79/020 "Methods for Chemical Analysis of Water and Wastes", Methods 300.0 (anions), 300.7 (cations), 353.2 (nitrogen, NO_3/NO_2), and 218.6 (Cr^{+6}) (EPA 1979). These requirements will be incorporated (directly or by reference) into onsite mobile laboratory analytical procedures.

To provide objective verification of the analytical quality of the onsite mobile laboratory operation, the laboratory will be enrolled in and periodically evaluated by the Proficiency Environmental Testing program, administered by the Analytical Products Group, a subsidiary of Curtin Matheson Scientific, Incorporated, 2730 Washington Boulevard, Belpre, Ohio 45714. The Proficiency Environmental Testing program distributes standards (i.e., spike samples) bimonthly to participating laboratories for analysis. Standards are provided for gas chromatograph analyses for volatile and semivolatile organics, x-ray fluorescence metals, and ions analyzed by ion chromatography. The Analytical Products Group collates and evaluates the results reported by all of the laboratories. The quality assurance officer for each laboratory receives a report of findings, including the true values of constituents in the standards, the individual laboratory's percent recovery, the means and standard deviations for all participating laboratories, and the individual laboratory's deviation from the mean for each standard.

7.2.6 Field Documentation

The field team leader will maintain a logbook during soil sampling activities, in accordance with EII 1.5, "Field Logbooks" (WHC 1988a). Information pertinent to ongoing activities at the closure area will be recorded in a legible manner with indelible ink in the logbook.

7.2.7 Evaluation of Data

Data reliability will be evaluated through a review of field documentation, sample handling procedures, analytical procedures, onsite mobile laboratory documentation, and calibration records. The purpose of the review will be to establish the reliability of the data by verifying that: (1) samples were labeled, handled, and controlled in a manner designed to minimize the possibility of physical misidentification, (2) instrumentation was maintained in calibration for the duration of the activity, and (3) analysis and calibration records are in complete and retrievable condition. Procedures for quality control documentation will follow SW-846, Chapter 1, "Quality Assurance" (EPA 1990).

7.2.8 Statistical Evaluation

Analytical results will be reviewed and summarized. Procedures for calculating detection and quantitation limits of constituents and for

reporting of data will follow the guidance in EPA SW-846, Chapter 1, "Quality Assurance" (EPA 1990) and *Characterization and Use of Soil and Groundwater Background for the Hanford Site* (WHC 1991a). Constituents will be eliminated from further consideration in cases where all results are below detection limits (provided the detection limit is below background). For the remaining constituents, data will be tabulated for statistical evaluation. Summary statistics will be computed. The following information for individual constituents will be summarized for presentation:

- Total number of values
- Number of values less than detection limits
- Minimum value
- Maximum value
- Mean
- Median
- Standard deviation
- Coefficient of variation.

Data analysis and evaluation procedures will be used that: (1) balance the false positive and false negative error rates; (2) are appropriate for the distribution of sample data for each analyte; and (3) are consistent with the nature of the data (e.g., the proportion of 'non-detects' in the data sets) and the applicable regulatory limits (background values or risk-based standards). Appropriate statistical methods might include (but would not be limited to) tests on means, percentiles, and/or proportions.

7.2.9 Determination of Proposed Action Levels

Action levels will be proposed for all contaminants of concern. Contaminant levels will be compared against proposed action levels to assess the need for remedial action. If a determination is made that some remedial action will be necessary as a condition of closure, a remedial action plan will be prepared. Soil cleanup action levels will be developed from Hanford Site background threshold values, MTCA-based acceptable exposure level information (WAC 173-340), and/or EPA soil cleanup guidance.

7.3 REMOVAL OF CONTAMINATED SOIL

If soil sampling results and assessments of remedial options should indicate that soil removal might be necessary to close the Ash Pit Demolition Site, this section of the closure plan will be implemented as indicated in Chapter 6.0, Figure 6-1. This section describes the following activities relating to soil removal:

- Estimating the volume of contaminated soil to be removed
- Soil removal survey control
- Soil removal operations
- Verification sampling.

7.3.1 Estimating the Volume of Contaminated Soil to be Removed

The volume of contaminated soil will be determined based on soil sampling results (i.e., the indicated constituents and their respective concentrations and distributions) and the constituent-specific proposed action levels (i.e., soil cleanup values). The volume of contaminated soil will be calculated in the following manner.

- Soil sample information will be plotted on a closure area plan drawing.

- A random sampling scheme has been proposed for initial soil sampling (Section 7.2.4). Supplemental sampling with portable field screening instrumentation might be carried out to better define the areal extent of contamination. Because contaminant concentration data typically are nonuniform, and random sampling schemes typically lead to unequal areas of influence around individual sample locations, it normally is necessary to apply some type of weighted-area technique to determine the volume of contaminated soil from the sample information. One common weighing technique involves construction of a 'Thiessen network' (Linsley and Franzini 1964). A Thiessen network is developed on a map by connecting adjacent sample locations by straight lines and erecting perpendicular bisectors to each connecting line. The polygon defined by the perpendicular bisectors around a sample location encloses an area that is everywhere closer to that sample location than to any other.

- Polygons containing elevated levels of contaminants relative to proposed action levels will be identified as contaminated areas. The vertical extent of contaminated soil within each contaminated area will be taken as 2 feet (0.6 meter) (conservatism added). For each contaminated area, the volume of soil to be removed will be determined as the product of the 2-foot (0.6-meter) depth and affected surface area. The total volume of contaminated soil will be computed as the sum of the volumes of the individual contaminated polygons and any 'surrounded' polygons.

7.3.2 Soil Removal Survey Control

Corner monuments installed at the site will serve as control points (semipermanent reference points with known horizontal and vertical coordinates) for any soil removal excavation work. The monuments also provided location control for the surface radiological survey and soil sampling activities. If removal of contaminated soil is necessary for clean closure of the site, additional control points may be installed as needed to effectively manage and document the excavation work. As preliminary actions, a survey grid will be projected over the area to be excavated, and a controlled drawing of the existing site topography will be prepared identifying all control point positions and soil sample locations. Depending upon the size and shape of the excavation area, elevation surveys and grade stakes will be used (as appropriate) to control the work. The controlled

drawing will be modified to show the extent of soil removed and the final site surface configuration. Afterward, the survey grid and the drawing(s) will assist in location control and documentation for verification sampling.

7.3.3 Soil Removal Operations

If necessary and if the contaminated soil volume is sufficient, it is envisioned that the soil removal operation will be performed using standard types of earth moving equipment (e.g., grader, front-end loader, backhoe, rear dump trucks, and water tanker truck). Excavation will be performed with either a backhoe or a front-end loader. If needed, to minimize dust generation and potential releases of contaminants, a water truck could apply water periodically to the excavation area and adjacent affected areas. Dust control activities will be repeated as necessary to maintain the soil in a damp (but not saturated) condition sufficient to minimize or eliminate dust production.

If the contaminated soil volume is small, 55-gallon (208-liter) containers will be used. Alternatively, soil could be bulk loaded into rear dump trucks. Trucks will be loaded in a conservative manner (with adequate space remaining below the top of the dump box) to ensure that spillage and/or unnecessary contamination of equipment surfaces does not occur. During truck loading and transportation, standard precautions will be taken to prevent airborne dispersal of materials from moving vehicles and/or the spread of contaminants by spilling or dripping of contaminated solids and/or liquids. A bed liner (or a truck with a continuous one-piece bed) will be used to prevent leakage. After a truck is loaded, the contaminated soil will be maintained in a damp condition and the load will be covered to prevent airborne contamination during transportation. The amount of moisture in the soil will be monitored to minimize or prevent the accumulation of free liquids in the truck bed.

Contaminated soil (containerized or bulk loaded) will be transported to a permitted (or interim status) disposal facility. An EPA hazardous waste manifest would be prepared to document each offsite shipment of contaminated soil as required in WAC 173-303-180 and 40 CFR 262. Contaminated soil will be prepared for shipment (i.e., labeled, marked, and placarded) as required in WAC 173-303-190. This section of the WAC incorporates by reference the applicable federal regulations on hazardous waste shipments (49 CFR 172, 173, 178, and 179).

If soil removal is necessary, the affected area will be recontoured with surrounding soils. After excavation and before recontouring of the removal areas, the affected area will undergo verification sampling (Chapter 6.0, Figure 6-1). Actual surface elevations will be checked against firing range design elevations and calculations to ensure that the firing range can fulfill its intended purpose. A final revision of the controlled closure area map will be prepared to show the 'as built' configuration of the firing range.

As appropriate, the destination of any removed soil will be identified within the Ash Pit Demolition Site Administrative Record. This identification

will be undertaken concurrently with the closure certification (Section 7.7). All removed waste will be managed and disposed of in accordance with Ecology regulations.

7.3.4 Verification Sampling

Verification sampling will be performed following soil removal to establish that residual concentrations of the designated constituents are below action levels (i.e., the objective of soil removal has been attained). Verification samples will be taken from the newly exposed surface area resulting from soil removal. It is envisioned that a simple random design approach would be used to select sample locations. The number of samples to be taken will depend on the extent of soil removal activities. Verification samples will be analyzed in an onsite mobile laboratory. The scope of sample analysis will be limited to quantifying the residual concentrations of designated constituents of concern to compare these concentration values to the cleanup standards. Before verification sampling, the number and location of the samples and the constituents for analysis will be submitted for regulatory concurrence. It is envisioned that verification samples would be analyzed by the same procedures identified in Section 7.2.2.

7.4 PERSONNEL TRAINING

Appendix 7B contains a brief description of the training courses. Training for soil sampling personnel is covered within the EIIs. All personnel entering the TSD unit during closure must have 40 hours of hazardous waste training (Appendix 7B). Before performing actual closure activities, specific work plans will be submitted to the lead regulatory agency for review. These documents will detail the specific work activities and will not be written until the latest technology and specific materials and equipment are known.

7.5 SCHEDULE FOR CLOSURE

Closure of the Ash Pit Demolition Site will begin on notification by Ecology of plan approval. Closure will proceed according to the schedule presented in Figure 7-2.

Official copies of the closure plan will be located at the following office:

U.S. Department of Energy,
Richland Field Office
Federal Building
825 Jadwin Avenue
P.O. Box 550
Richland, Washington 99352.

The DOE-RL office will be responsible for amending this closure plan, as deemed necessary, according to the amendment procedures in WAC 173-303-610. The closure plan will be kept at the DOE-RL office until closure is complete and certified.

7.6 AMENDMENT OF CLOSURE PLAN

The closure plan for the Ash Pit Demolition Site will be amended whenever changes in operating plans or unit design affect the closure plan; whenever there is a change in the expected year of closure; or if, when conducting closure activities, unexpected events require a modification of the closure plan. The closure plan will be modified in accordance with WAC 173-303-610. This plan may be amended any time before certification of final closure of the Ash Pit Demolition Site.

If an amendment to the approved closure plan is required, the DOE-RL will submit a written request to the lead regulatory agency to authorize a change to the approved plan. The written request will include a copy of the closure plan amendment for approval.

7.7 CERTIFICATION OF CLOSURE AND SURVEY PLAT

Within 60 days of closure of the Ash Pit Demolition Site, the DOE-RL will submit to the Benton County Auditor and the lead regulatory agency a certification of closure and a duly certified survey plat. The certification of closure will be signed by both the DOE-RL and a registered independent professional engineer, stating that the unit has been closed in accordance with the approved closure plan. The certification will be submitted by registered mail or an equivalent delivery service. Documentation supporting the independent registered professional engineer's certification will be supplied upon request of the regulatory authority.

The DOE-RL and the independent professional engineer will certify with a document similar to Figure 7-3.

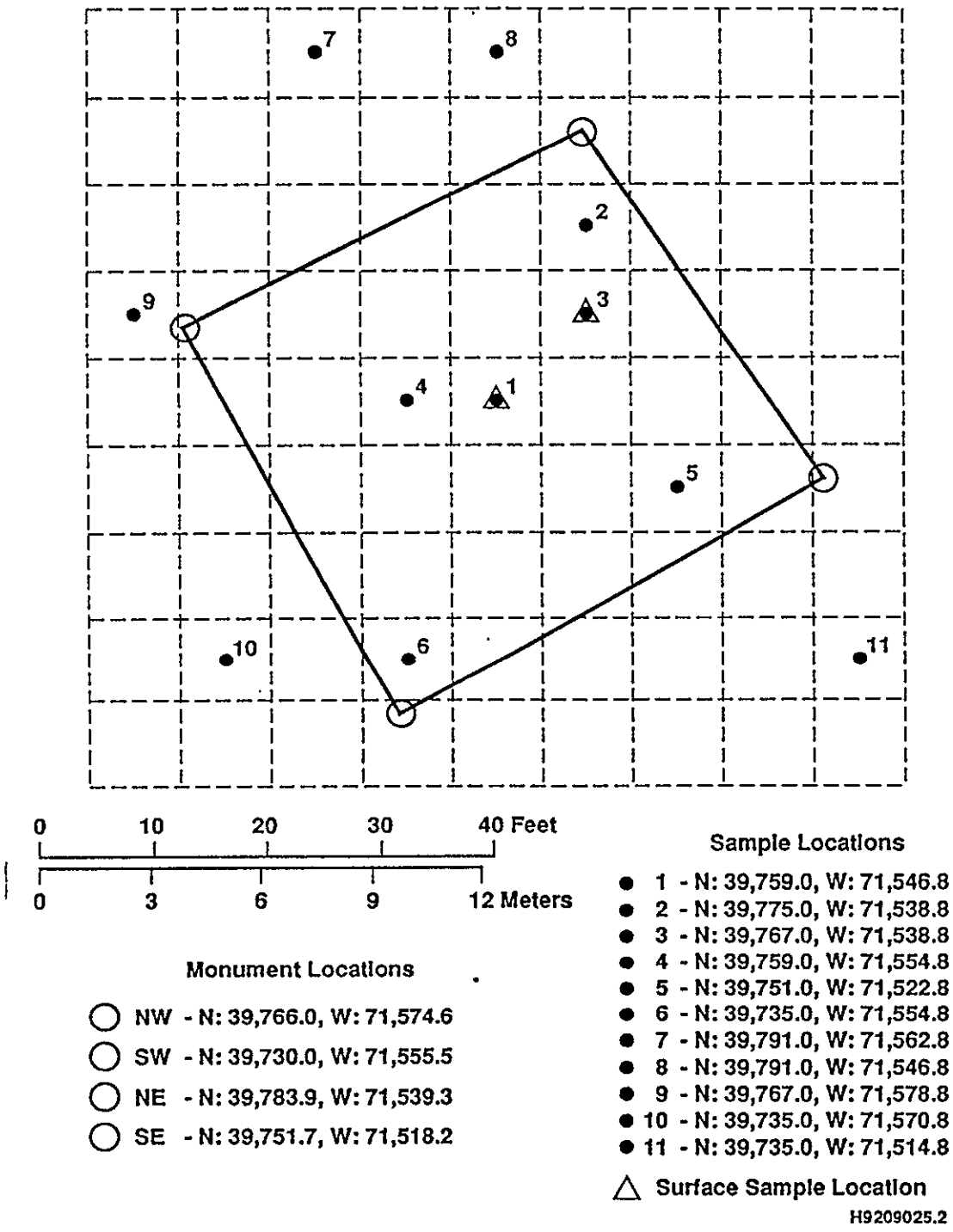

Figure 7-1. Soil Sample Locations for the 200 West Ash Pit Demolition Site.

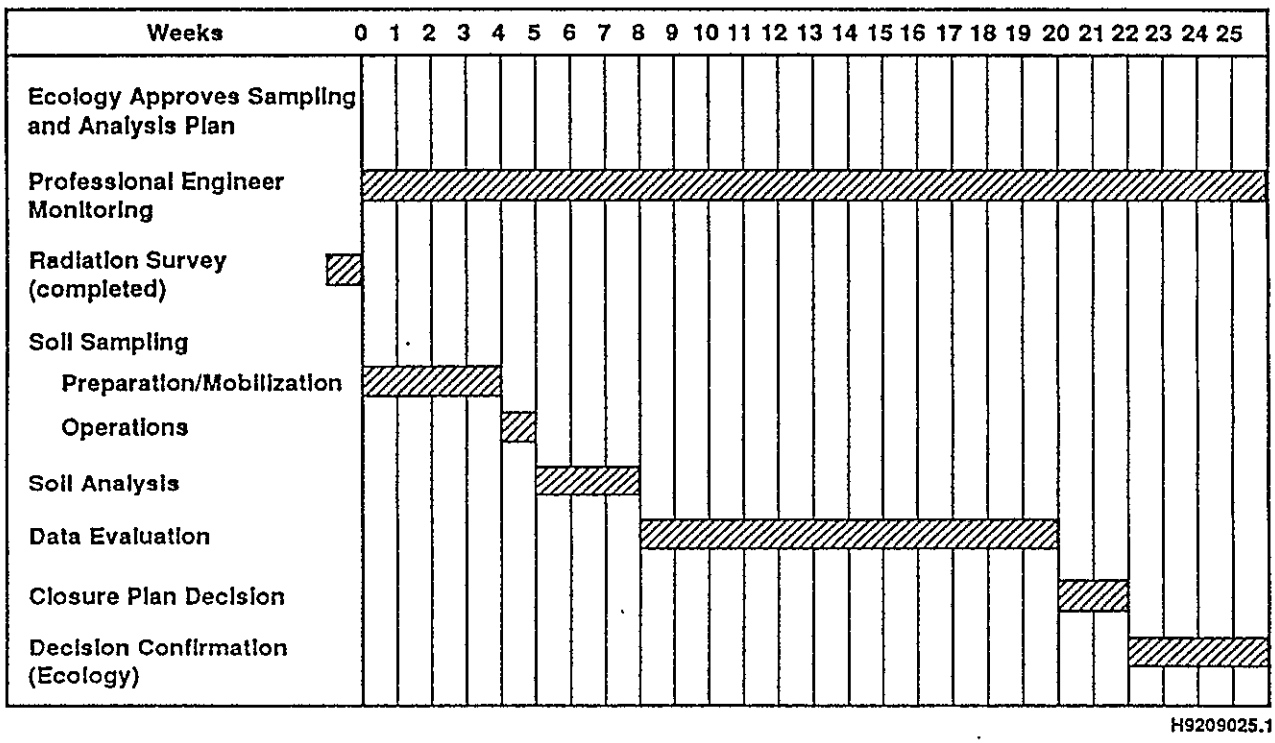

Figure 7-2. 200 West Ash Pit Demolition Site Closure Schedule.

CLOSURE CERTIFICATION
FOR

_____

Hanford Site
U.S. Department of Energy, Richland Field Office

We, the undersigned, hereby certify that all _____ _____ closure activities were performed in accordance with the specifications in the approved closure plan.

_____ _____
Owner/Operator Signature DOE-RL Representative (Typed Name) Date

_____ P.E.# _____ State ___ _____
Signature Independent Registered Professional Engineer (Typed Name, Professional Engineer license number, state of issuance, and date of signature) Date

Figure 7-3. Typical Closure Certification Document.

Table 7-1. Proposed Analytes of Interest, Analytical Methods and Recommended Holding Time Limits for Investigative Soil Sampling 200 West Ash Pit Demolition Site.

Analysis for Volatile Organics by Purge and Trap Followed by GC/MS (holding time = 14 days to analyze):

Target Compound List (TCL) Analytes:

- Benzene
- Toluene

Tentatively Identified Compound (TIC) Analytes:

- Acrolein (poor purging analyte)
- 1,2-Bis(2-chloroethoxy)ethane
- Bromobenzene
- 2-Butoxyethanol
- Cyclohexane
- Diisopropyl benzene
- Dioxane (poor purging analyte)
- Ethyl acetate
- Ethyl ether
- Heptane
- Hexane
- Isopropyl ether
- Naphtha (petroleum naphtha)
- Nitromethane
- Tetrahydrofuran
- Tetrahydronaphthalene

Analysis for Semivolatile Organics by Supercritical Fluid Extraction followed by GC/MS (holding time = 7 days to extract/40 days to analyze following extraction):

- Phenyl ether
- Picryl chloride

Aqueous Extraction Followed by Direct Aqueous Injection (holding time = 14 days to analyze):

- Allyl alcohol (degradation product of allyl magnesium bromide)
- n-Butyl alcohol (degradation product of butyllithium)
- Ethylene glycol monoethyl ether
- Methanol
- p-Nitrobenzoic acid (degradation product of p-Nitrobenzoyl chloride)
- Picric acid

Analysis for Metals by X-Ray Fluorescence (holding time = 6 months):

- Chromium metal, powdered

Ions by Ion Chromatography (holding time = 28 days to analyze):

- Chloride
- Sulfate
- Sulfide

Ancillary Analyses (no holding time limit - analyze immediately after adding water):

- Soil pH (by H^+ ion selective electrode method)

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8.0 POSTCLOSURE PLAN

In the event that the Ash Pit Demolition Site cannot be clean closed and that residual soil contamination remains after soil removal activities, a Ash Pit Demolition Site postclosure permit application will be submitted in accordance with WAC 173-303 regulations.

8.1 NOTICE IN DEED BOOK

This closure plan proposes that the Ash Pit Demolition Site be closed with no residual soil contamination that would pose a threat to human health or the environment. However, if closure cannot be secured, the following action will be taken in accordance with WAC 173-303-610(1)(b). Within 60 days of the certification of closure, the DOE-RL will sign, notarize, and file for recording the notice indicated below. The notice will be sent to the Auditor of Benton County, P.O. Box 470, Prosser, Washington, with instructions to record this notice-in-deed book.

TO WHOM IT MAY CONCERN

The United States Department of Energy, Richland Field Office, an operations office of the United States Department of Energy, which is a department of the United States Government, the undersigned, whose local address is the Federal Building, 825 Jadwin Avenue, Richland, Washington, hereby gives the following notice as required by 40 CFR 265.120 and WAC 173-303-610(10) (whichever is applicable):

(a) The United States of America is, and since April 1943, has been in possession in fee simple of the following described lands: (legal description of the Ash Pit Demolition Site)

(b) The United States Department of Energy, Richland Field Office, by operation of the Ash Pit Demolition Site, has disposed of hazardous and/or dangerous waste under other terms of regulations promulgated by the United States Environmental Protection Agency and the Washington State Department of Ecology (whichever is applicable) at the above described land

(c) The future use of the above described land is restricted under terms of 40 CFR 264.117(c) and WAC 173-303-610(7)(d) (whichever is applicable)

(d) Any and all future purchasers of this land should inform themselves of the requirements of the regulations and ascertain the amount and nature of wastes disposed on the above property

(e) The United States Department of Energy, Richland Field Office has filed a survey plat with the Benton County Planning Department and with the United States Environmental Protection Agency, Region 10, and the Washington State Department of Ecology (whichever are

applicable) showing the location and dimensions of the Ash Pit Demolition Site and a record of the type, location, and quantity of waste treated.

8.2 POSTCLOSURE CARE

Postclosure care is required when a TSD unit has residual contamination that poses a problem to human health or the environment. At the Ash Pit Demolition Site, underlying soils and possibly groundwater might have been contaminated by waste treated during Ash Pit Demolition Site operations. Under the Tri-Party Agreement, source contamination and groundwater operable units will be investigated and remediated under the CERCLA process.

As described in Chapter 6.0, soil remediation may be deferred to the CERCLA remedial investigation/feasibility study process. If the soil is contaminated from Ash Pit Demolition Site detonation activities, the TSD unit will not be considered closed until the remediation is complete. If closure is deferred until larger-scale cleanup is implemented, the TSD unit area will be inspected, at a minimum, once a year until CERCLA remediation. This inspection would be combined with TSD unit inspections presently conducted. The inspections would determine the need for maintenance of any temporary covers or other physical barriers. Any required maintenance would be performed by Hanford Site personnel.

Any data obtained from sampling and analyses during RCRA closure activities will be part of the official record and included with the closure plan. These data will be taken into account and used during the CERCLA evaluation of the 200-SS-2 operable unit, as well as any data collected specifically for the CERCLA evaluation.

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9.4 WASHINGTON ADMINISTRATIVE CODE AND REVISED CODE OF WASHINGTON

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WAC 173-340, *Model Toxics Control Act Cleanup Regulations*, as amended, Washington State Department of Ecology, Olympia, Washington.

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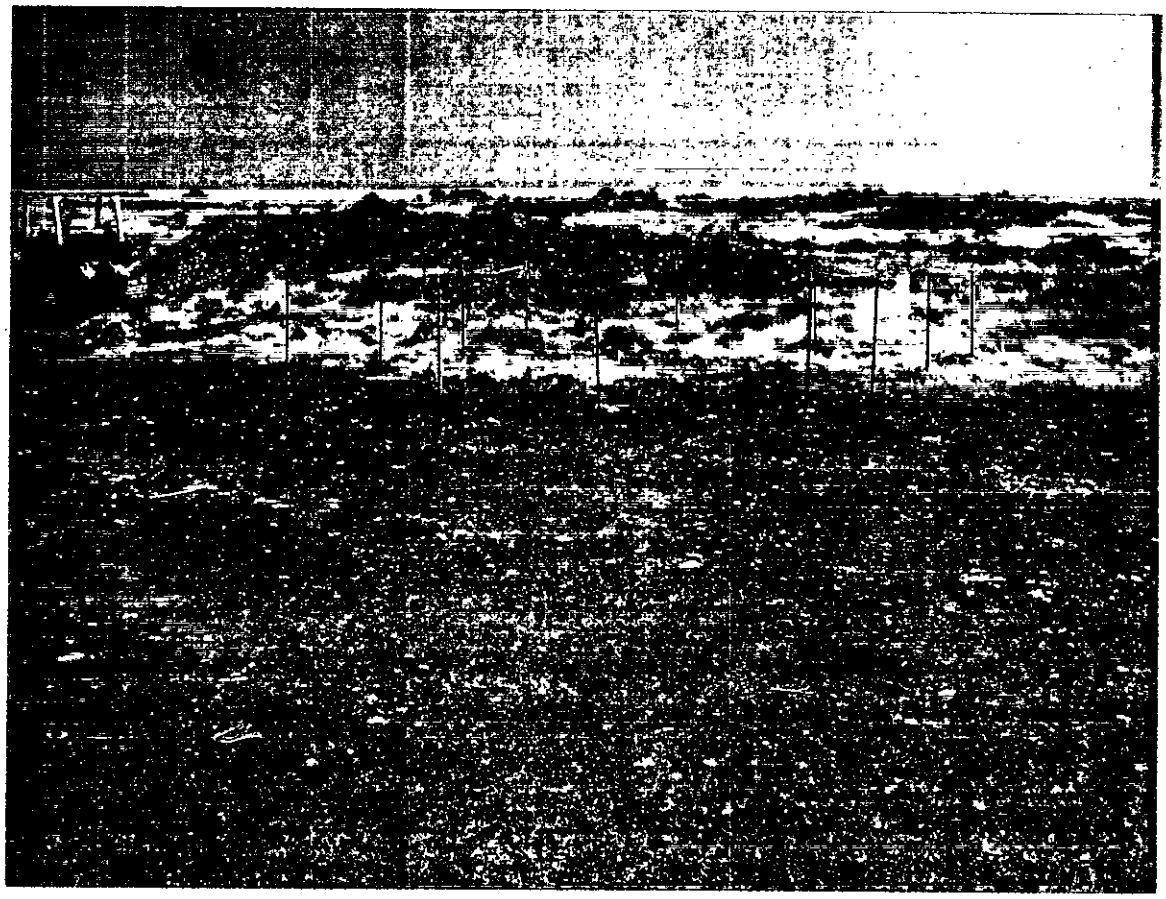

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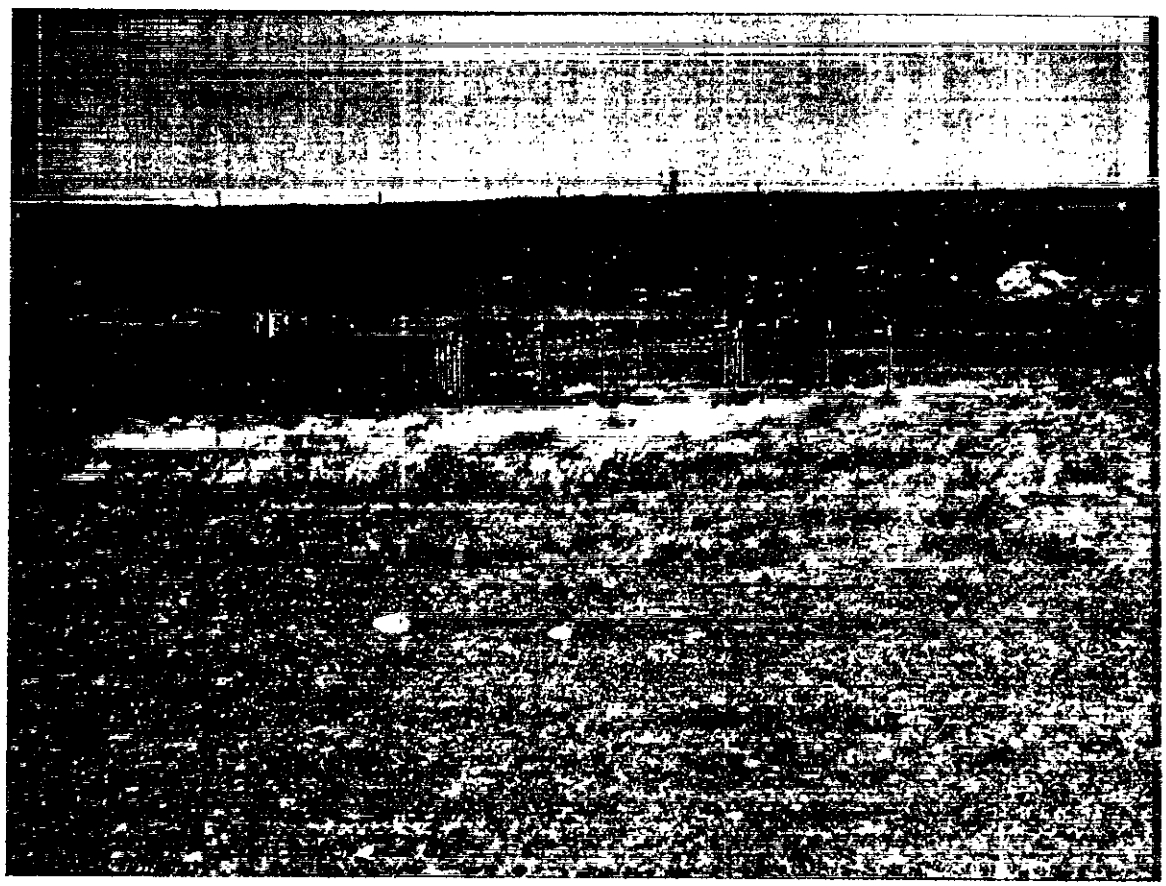
(Photograph taken 1992)

200 West Ash Pit Demolition Site, Facing Southeast.



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(Photograph taken 1992)

200 West Ash Pit Demolition Site, Facing North.

APPENDIX 7A

QUALITY ASSURANCE PROJECT PLAN FOR SOIL SAMPLING AND ANALYSIS FOR THE 200 WEST ASH PIT DEMOLITION SITE

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7A.0 QUALITY ASSURANCE PROJECT PLAN FOR SOIL SAMPLING AND ANALYSIS FOR THE 200 WEST ASH PIT DEMOLITION SITE

This appendix provides the quality assurance and quality control information for assuring that the Ash Pit Demolition Site closure activities (Chapter 7.0) will provide suitable closure data.

7A.1 PROJECT DESCRIPTION

On two occasions, in November 1984 and June 1986, characteristic ignitable and reactive dangerous waste, consisting predominantly of organic compounds and metal salts, was detonated at the Ash Pit Demolition Site. This TSD unit will undergo closure consistent with WAC 173-303. The present status of soil contamination at the Ash Pit Demolition Site is unknown. One or more rounds of soil sampling and analysis are proposed in the closure plan to identify and characterize constituents of concern in the surface soils at the Ash Pit Demolition Site. This quality assurance project plan (QAPjP) has been prepared for regulatory review with the closure plan in support of proposed sampling and analysis activities.

7A.1.1 Project Objectives

The principal objective of investigative sampling will be to determine whether dangerous waste constituents are present in the surface soils at the site at levels of potential regulatory concern. If soil contaminants are discovered at or above levels of concern, then a secondary objective of sampling will be to define the extent of contamination. A minimum of one round of soil sampling is proposed at the Ash Pit Demolition Site for the overall purpose of characterizing soil contamination. Collected samples will be analyzed in an onsite mobile laboratory.

If any soil is removed from the Ash Pit Demolition Site to facilitate closure, an intermediate round of sampling and analysis (verification sampling) would be performed to demonstrate that soil removal objectives had been achieved (i.e., that residual contamination levels were below the proposed cleanup values).

If needed, another round of soil sampling and analysis (confirmatory sampling) might be performed to provide confirmation of previous analytical results produced by the onsite mobile laboratory. Confirmatory samples will be split. One set of splits might be analyzed by the onsite mobile laboratory. The second set of splits might be analyzed by an EPA-approved subcontractor laboratory.

7A.1.2 Applicability and Relationship to the Onsite Contractor's Quality Assurance Program

This QAPjP applies specifically to field activities and laboratory analyses to be performed in support of closure of the Ash Pit Demolition Site. This QAPjP has been prepared in compliance with the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). This QAPjP describes the means selected to implement quality assurance program requirements, defined in the *Quality Assurance Manual* (WHC 1988b), as the requirements apply to environmental investigations, while accommodating the specific requirements for project plan format and content agreed upon in the Tri-Party Agreement. The project plan contains a matrix of procedural resources from *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a) and *Environmental Investigations and Site Characterization Manual* (WHC 1988a). This QAPjP is subject to mandatory review and revision in advance of initiation of field sampling activities. Distribution and revision control of this plan will be carried out in compliance with QR 6.0, "Document Control," and QI 6.1, "Quality Assurance Document Control" (WHC 1988b). All plans and procedures referenced in this QAPjP are available for regulatory review.

7A.2 PROJECT ORGANIZATION AND RESPONSIBILITIES

Organization responsibilities are discussed in the following sections.

7A.2.1 Project Management Responsibilities

The operations contractor's Regulatory Support organization and the Environmental Restoration Engineering Function have primary responsibilities for conducting this investigation. An organizational chart is included as Figure 7A-1. The responsibilities of key test personnel and organizations are described in the following.

- **Dangerous Waste Closure Plan Lead (Regulatory Support Organization)**--The Dangerous Waste Closure Plan Lead is responsible for the overall organization of the closure plan and will interface with the regulatory agencies and the U.S. Department of Energy.

- **Technical Lead**--The Technical Lead is responsible for overall direction of sampling and testing activities; responsibilities include the planning and authorization of all work and management of any subcontracted activities, as well as overall technical schedule and budgetary performance.

- **Quality Assurance Officer**--The Quality Assurance Officer is responsible for coordination and/or oversight of performance to the QAPjP requirements by means of internal auditing and surveillance techniques. The Quality Assurance Officer retains the necessary organizational independence and authority to identify conditions

adverse to quality and to inform the Technical Lead of needs for corrective action.

- **Health and Safety Officer (Environmental Division/Environmental Field Services)**--The Health and Safety Officer is responsible for determining potential health and safety hazards from volatile and/or toxic compounds during sample handling and sampling decontamination activities. The Health and Safety Officer has the responsibility and authority to halt field activities because of unacceptable health and safety concerns.

- **Health Physics Technician**--The health physics technician is responsible for ensuring that all monitoring and protection procedures are being followed as required in the dangerous waste operations plan. The health physics technician has the authority to take whatever steps might be necessary to carry out this function.

- **Field Team Leader**--The Field Team Leader is responsible for onsite direction of sampling technicians in compliance with the requirements of the sampling plan (Chapter 7.0, Section 7.2), this QAPjP, and implementing all EIIs.

- **Sample Management Organization**--The sample management organization is responsible for procurement and coordination of analytical support services, sample tracking through the laboratories, and receipt and validation of analytical data as discussed in Section 7A.8.

7A.2.2 Analytical Laboratories

The field sampling team will be responsible for screening all samples for gross alpha and beta/gamma radioactivity and for separating samples for further analysis. Samples with levels exceeding 200 picocuries per gram (total activity) or 60 picocuries per gram (alpha) will be routed to a Hanford Site or participating contractor laboratory qualified to handle analysis of radioactive samples. Samples exceeding 200 picocuries per gram (total activity) or 60 picocuries per gram (alpha) are not expected for this investigation. Samples with lower levels of radioactivity will be routed in accordance with the procedures identified below for chemical samples.

Samples will be routed to an onsite participating contractor, or subcontractor laboratory, who will be responsible for performing the analyses identified in the sampling and analysis plan in Chapter 7.0 and Tables 7A-1 and 7A-2 of this plan, in compliance with work orders or contractual requirements and approved procedures (Section 7A.4.1.2). At the direction of the Technical Lead, services of alternate qualified laboratories may be procured for the performance of split-sample analyses for performance audit purposes. If such an option is selected, the alternate laboratory's quality assurance plan and applicable analytical procedures will be approved before use in compliance with Section 7A.4.1.2 requirements.

7A.2.3 Other Support Contractors

Support contractors could be assigned project responsibilities at the direction of the Technical Lead. Such services will be in compliance with standard Hanford Site procurement procedure requirements as discussed in Section 7A.4.1.2. All work will be performed in compliance with approved quality assurance plans and/or procedures, subject to controls of QI 7.3, "Source Surveillance and Inspection" (WHC 1988b).

7A.3 DATA QUALITY OBJECTIVES FOR MEASUREMENTS

Data quality objectives for a given data collection activity describe the overall level of uncertainty that decision makers are prepared to accept in the analytical results deriving from the activity. Data quality requirements generally are defined in terms of specific objectives for precision, accuracy, representativeness, comparability, and completeness. Objectives for soil sampling at the Ash Pit Demolition Site is described in this section. Analytes of interest, proposed analytical methods, analytical support levels, and target practical quantitation limit values are listed in Tables 7A-1 and 7A-2.

Precision typically is calculated either as a range (R) (for duplicate measurements) or a standard deviation (σ). Precision also can be expressed as a relative range (RR) (for duplicates) or a relative standard deviation (RSD). When the precision for a method is not constant over the concentration range of interest, the reported range or standard deviation will describe the concentration dependence. The dependence alternatively could be described in terms of a slope and intercept for a linear relationship, an indicated function for a nonlinear relationship, or a tabulated set of precision values for specific indicated concentrations.

Accuracy usually is expressed as percent recovery (P) or as percent bias (P-100). When accuracy is observed to be significantly concentration dependent, it could be reported in terms of a linear relationship, an alternative functional relationship, or as a table of measured values.

The method detection limit is the minimum concentration of a chemical constituent that can be measured reliably (i.e., it can be reported with 99 percent confidence that the analyte concentration is greater than zero). The method detection limit is determined from a minimum of three replicate analyses of samples of a given matrix type (water, soil, etc.) spiked with the analyte of interest. The method detection limit is the standard deviation of the replicate measurements (reported in concentration units) multiplied by the appropriate Student's t value for the number of replicates taken for a one-tailed test at the 99 percent level of confidence. Practical quantitation limit is defined in SW-846 (EPA 1990) as the lowest concentration level that can be determined reliably within specified limits of precision and accuracy during routine laboratory operating conditions. Practical quantitation limit values are tabulated in SW-846 for various EPA approved analytical methods for evaluating solid waste. Practical quantitation limit values are matrix-dependent and method-dependent. Typically, practical quantitation limits are

listed as multiples of the method detection limits for specified methods and matrix types.

Requirements are identified in the sampling and analysis plan for collection of split samples and duplicates for the purpose of evaluating the precision of laboratory analyses. In the sampling and analysis plan, specific quality assurance and quality control requirements are identified for each individual instrument system within the onsite mobile laboratory. These requirements prescribe the types and frequencies of calibration checks to be performed, the minimum frequencies for analyses of splits and duplicates (for evaluation of method precision) and matrix spikes and reference samples (for evaluation of method accuracy). Accuracy and precision will be calculated and reported as described previously.

The performance of the analytical laboratory will be subject to method- and analyte-specific quantitation limits as identified in Tables 7A-1 and 7A-2 and minimum requirements for precision, accuracy, and completeness as follows:

- Precision: The range (R), or difference, for individual pairs of duplicates shall be within (i.e., less than) the critical range (R_c) value. The critical range is determined from the historical average value of the range ($\overline{R}$) as follows (ASTM 1983):

  $$R_c = 3.27\ \overline{R}$$

  (When this technique is employed to evaluate precision, R_c must be recomputed periodically to reflect the most current value of $\overline{R}$.)

- Accuracy: Percent recoveries (P) for individual determinations of spikes and standards must fall within 2 standard deviations (95 percent confidence interval) of the average percent recovery ($\overline{P}$) (ASTM 1983).

- Completeness: Requirements for precision and accuracy will be met for at least 80 percent of the total number of determinations on quality assurance and quality control samples.

More stringent requirements for precision and accuracy could be specified in procedures for individual laboratory methods. In that event, the more stringent requirements also will apply as data quality objectives for this project.

Goals for data representativeness for soil sampling are addressed qualitatively by the specification of sample locations and intervals in the soil sampling and analysis plan. Sample data should be comparable with other measurement data for similar samples and sample conditions. Comparability will be achieved qualitatively by using standard techniques to collect and analyze representative samples and by reporting analytical results in appropriate units.

Approved analytical procedures will require adherence to reporting techniques and units that are consistent with EPA reference methods to facilitate the comparability of data sets in terms of precision and accuracy. Actual achieved and/or used detection limits, and values for precision, accuracy, and completeness will be provided in all summary reports of analyses.

Failure to conform to these criteria will be documented in data summary reports as described in Section 7A.8.1, and will be evaluated in the validation process discussed in Section 7A.8.2. Corrective actions will be initiated by the Technical Lead as appropriate, as noted in Section 7A.13, in the event that the criteria initially are not achieved.

For any soil sampling activities that are to occur at the Ash Pit Demolition Site subsequent to investigative sampling, Table 7A-1 will be updated to reflect current analytes of interest and data quality objectives as project requirements. The listed practical quantitation limit values in Table 7A-1 will be used as target values in negotiations for procurement of analytical laboratory services in support of these activities.

7A.4 PROCEDURES

The following sections discuss sampling procedures to be used and the approvals and control of these procedures.

7A.4.1 Procedure Approvals and Controls

The following sections describe the procedures referenced to support soil sampling and analysis activities.

7A.4.1.1 Hanford Site Procedures. The Hanford Site procedures that have been referenced to support soil sampling and analysis activities for the Ash Pit Demolition Site are listed in the quality assurance program index in the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). Referenced procedures include EIIs (WHC 1988a), and quality requirements (QRs) and quality instructions (QIs) (WHC 1988b). Requirements relating to approval, revision, and distribution control of EIIs are addressed in EII 1.2, "Preparation and Revision of Environmental Investigation Instructions"; requirements applicable to QIs and QRs are addressed in QR 5.0, "Instructions, Procedures, and Drawings"; QI 5.1, "Preparation of Quality Assurance Documents:; QR 6.0, "Document Control"; and QI 6.1, "Quality Assurance Document Control". Other controlling documents that apply to preparation, review, and revision of Hanford Site analytical laboratory procedures and sample management procedures are identified under Criteria 5.00 and 6.00 in the *Environmental Engineering, Geotechnology, and Permitting Function Quality Assurance Program Plan* (WHC 1990a). All of the aforementioned procedures will be available on request for regulatory review.

7A.4.1.2 Participating Contractor and/or Subcontractor Procedures. As noted in Section 7A.2.1, participating contractor and/or subcontractor services may

be procured at the direction of the Technical Lead. All such procurements will be subject to the applicable requirements of QR 4.0, "Procurement Document Control"; QI 4.1, "Procurement Document Control"; QI 4.2, "External Services Control"; QR 7.0, "Control of Purchased Items and Services"; QI 7.1, "Preprocurement Planning and Proposal Evaluation"; and/or QI 7.2, "Supplier Evaluation" (WHC 1988b). Whenever such services require procedural controls, conformance to onsite procedures, or submittal of contractor procedures for onsite review and approval before implementation, the requirement(s) will be identified in the procurement document or work order, as applicable. Analytical laboratories will be required to submit their analytical procedures as well as the current version of their internal quality assurance program plans for review and approval. The subject plans and procedures will be reviewed and approved by operations contractor's quality assurance, sample management, and analytical laboratories organization personnel, and/or other qualified personnel as determined by the Technical Lead. As necessary, all reviewers will be qualified per the requirements of EII 1.7, "Indoctrination, Training, and Qualification" (WHC 1988a). All approved participating contractor or subcontractor procedures, plans, and/or manuals will be retained as project quality records in compliance with the *Document Control and Record Management Manual*, Section 9 (WHC 1989a); QR 17.0, "Quality Assurance Records"; and QI 17.1, "Quality Assurance Records Control" (WHC 1988b). All such documents will be available on request for regulatory review.

7A.4.2 Sampling Procedures

Soil samples for analysis in the onsite mobile laboratory and for confirmatory analysis by an offsite contractor laboratory will be collected in compliance with EII 5.2, "Soil and Sediment Sampling" (WHC 1988a). Sample numbers will be assigned as indicated in EII 5.10, "Obtaining Sample Identification Numbers and Accessing HEIS Data" (WHC 1988a). Sampling activities will be carried out in conformance with the sample identification, container type, preparation, and preservation requirements of EII 5.11, "Sample Packaging and Shipping" (WHC 1988a).

Field screening analyses for chemical constituents will be performed in accordance with EII 5.9, "Soil Gas Sampling" (WHC 1988a). Additional appendices to EII 5.9 (in preparation) will address operation, maintenance, and calibration procedures for various individual field portable instruments.

7A.4.3 Procedure Additions and Changes

Additional EIIs or modifications to existing EIIs that might be required as a consequence of sampling plan requirements will be developed in compliance with EII 1.2, "Preparation and Revision of Environmental Investigations Instructions" (WHC 1988a). Should deviations from established EIIs be required to accommodate unforeseen field situations, the Field Team Leader can authorize such deviations consistent with provisions and requirements in EII 1.4, "Deviation from Environmental Investigations Instructions" (WHC 1988a). Deviations are documented, reviewed, and dispositioned by means of instruction change authorization forms, as required by EII 1.4. Other

types of document change requests will be completed as required by the procedures governing their preparation and revision.

7A.5 SAMPLE CUSTODY

All samples obtained during the course of this investigation will be controlled from the point of origin to the analytical laboratory as stipulated in EII 5.1, "Chain of Custody" (WHC 1988a). Chain-of-custody documentation also will be maintained for the return of residual sample materials from the laboratory. Requirements and procedures will be defined in procurement documentation to subcontractor or participant contractor laboratories for the return of residual sample materials after completion of analysis. Laboratory chain-of-custody procedures will ensure that sample integrity and identification are maintained throughout the analytical process and will be reviewed and approved in advance as required by onsite procurement control procedures, as noted in Section 7A.4.1.2.

Results of analyses will be traceable to the original samples through a unique code or identifier, as specified in Section 7A.4. All analytical results will be controlled as permanent project quality records as required by QR 17.0, "Quality Assurance Records" (WHC 1988b) and EII 1.6, "Records Management" (WHC 1988a).

Sample and/or data flow will be coordinated by the sample management organization (Figure 7A-1). The sample management organization will be responsible for tracking, controlling, and verification of in-process samples and data per Section 1.0, "Sample Tracking"; Section 1.3, "Data Package Control", and Section 1.1, "Data Package Verification" (WHC 1990b).

All soil samples will be screened in the field for beta/gamma and gross alpha radioactivity in compliance with approved Hanford Site health physics procedures (WHC 1988c). Samples must be released for offsite shipment by health physics technicians before the samples can be transported to offsite laboratories for analysis of dangerous constituents.

7A.6 CALIBRATION PROCEDURES

Calibration of all measuring and test equipment, whether in existing inventory or purchased for this investigation will be controlled as required by QR 12.0, "Control of Measuring and Test Equipment"; QI 12.1, "Acquisition and Calibration of Portable Measuring and Test Equipment"; QI 12.2, "Measuring and Test Equipment Calibration by User" (WHC 1988b); and/or applicable EIIs (WHC 1988a). Routine operational checks for field equipment will be as defined within applicable EIIs or other field procedures. Similar information will be provided in operations contractor-approved participating contractor or subcontractor procedures.

Calibration of Hanford Site, participating contractor, and/or subcontractor laboratory analytical equipment will be performed per applicable standard methods, subject to review and approval.

7A.7 ANALYTICAL PROCEDURES

Specific analytical methods or procedures will be reviewed and approved before use in compliance with the procedures and procurement control requirements noted in Section 7A.4.1.

7A.8 DATA REDUCTION, VALIDATION, AND REPORTING

Data reduction, validation of completed laboratory data packages, reporting requirements, and review and records management are discussed in the following sections.

7A.8.1 Data Reduction and Data Package Preparation

On completion of each group of analyses, the analytical laboratory will be responsible for preparing a report summarizing the analytical results. The analytical laboratory also will prepare a detailed data package that will include all information necessary to perform data validation to the extent indicated by the minimum applicable requirements of Section 7A.8.2. Data summary report format and data package content will be defined in procurement documentation subject to review and approval as noted in Section 7A.4.1. As a minimum, laboratory data packages will include the following:

- Sample receipt and tracking documentation (including identification of the organization and individuals performing the analysis, the names and signatures of the responsible analysts, sample holding time requirements, references to applicable chain-of-custody procedures, and the dates of sample receipt, extraction, and analysis)

- Instrument calibration documentation, including equipment type and model, with continuing calibration data for the time period in which the analyses were performed

- Quality control data, as appropriate for the methods used, including matrix-spike/matrix-spike duplicate data, recovery percentages, precision data, laboratory blank data, and identification of any nonconformances that might have affected the laboratory's measurement system during the time in which the analyses were performed

- The analytical results or data deliverables, including reduced data, reduction formulas or algorithms, and identification of data outliers and/or deficiencies.

Other supporting information, such as initial calibration data, reconstructed ion chromatographs, spectrograms, traffic reports, and raw data, need not be included in submittal of individual data packages unless specifically requested by the Technical Lead or the sample management office. All sample data, however, will be retained by the analytical laboratory and made available for systems or program audit purposes upon the request of the

operations contractor, DOE-RL, or regulatory agency representatives (Section 7A.10.0). Such data will be retained by the analytical laboratory through the duration of the contractual statement of work, at which time the data will be transmitted for archiving.

A completed data package will be reviewed and approved by the analytical laboratory quality assurance manager before the package is submitted to the sample management organization for validation.

The requirements of this section will be included in procurement documents and/or work orders, as appropriate, in compliance with the procurement control procedures identified in Section 7A.4.1.

7A.8.2 Validation

Validation of completed laboratory data packages will be performed by the sample management organization. Data validation and reporting will be performed in conformance with requirements and procedures identified in *Data Validation Procedures for Chemical Analyses* (WHC 1992).

In the case of data obtained by field screening methods, the results will not be submitted in the form of data packages or sample delivery groups, and data reduction and reporting will not be subject to validation.

Data validators will perform a number of tasks on each sample delivery group in response to general and specific requirements identified in the data validation procedures (WHC 1992). A sample delivery group is defined as a group of samples (usually 20 or fewer) reported within a single laboratory data package. These tasks are summarized as follows:

- Take delivery of the data package, stamp the receipt date on the package, and make duplicate copies of the sample concentration reports or report forms

- Organize and review the data package for completeness as described in the data validation procedures Section 3.0 through Section 9.0 (WHC 1992) and document the completeness review on the applicable data validation checklist

- Validate the data package and qualify sample results according to the procedures and criteria described in the data validation procedures Section 3.0 through Section 10.0 (WHC 1992). Data that are rejected at any point during validation will be eliminated from further review or consideration

- Check for calculation and transcription errors, applying the frequency guidelines identified below

- Resolve any discrepancies identified during the review of the data package, including any missing data, with the laboratory

- After the data have been validated, prepare a narrative summary of the acceptability of the data, and prepare a summary of the validated results in tabular and electronic formats

- Submit the data validation report, with the narrative summary, an electronic media copy of the data, checklists, summary forms, and the qualified laboratory concentration reports to the Technical Lead within 21 days after receipt of the data package from the laboratory.

For this sampling and analysis project, the following frequencies will be used to check for calculation and transcription errors.

- **Investigative samples and verification samples taken following soil removal**--All reported laboratory results for at least 20 percent of the samples contained in the sample delivery group and 100 percent of the reported quality control samples (duplicates, matrix spikes, field blanks and any performance audit samples) will be recalculated and verified against the instrument printouts and bench sheet records (raw data). If possible, at least one-half of the samples selected for recalculation should contain positive results for the compounds analyzed.

- **Confirmatory samples**--All reported laboratory results for 100 percent of the samples contained in the sample delivery group and 100 percent of the reported quality control samples (duplicates, matrix spikes, field blanks and any performance audit samples) will be calculated and verified against the raw data.

Reporting requirements for validation of data produced by routine and special analytical methods other than EPA reference methods (EPA 1990) will be established within applicable procedures for the individual methods, subject to review and approval as discussed in Section 7A.4.1. The reporting requirements will be in general compliance with the guidelines provided previously in this section.

7A.8.3 Final Review and Records Management Considerations

All validation reports and supporting analytical data packages will be subjected to a final technical review by a qualified reviewer at the direction of the Technical Lead before submittal to regulatory agencies or inclusion in reports or technical memoranda. All validation reports, data packages, and review comments will be retained as permanent project quality records in compliance with *Document Control and Records Management Manual*, Section 9 (WHC 1989a) and QR 17.0, "Quality Assurance Records" (WHC 1988b).

7A.9 INTERNAL QUALITY CONTROL

All analytical samples will be subject to in-process quality control measures both in the field and in the laboratory. The following types of

control samples are specified in the sampling and analysis plan for the purpose of maintaining internal quality control.

- Duplicate Samples--Field duplicate samples are samples retrieved from a single sampling location using the same equipment and sampling technique, but analyzed independently. Laboratory duplicate samples are samples taken successively from the same bulb. Duplicate samples generally are used to verify the repeatability or reproducibility of the analytical data.

- Split Samples--Field or field duplicate samples can be split in the field and sent to an alternative laboratory as a performance audit of the primary laboratory.

- Trip Blanks--A trip blank for soil sampling consists of a sample container of pure silica sand that is prepared in the laboratory, transported to the sampling site, and returned unopened for analysis with the actual soil samples. Analysis of the trip blank will eliminate false positive results for the actual samples arising from contamination during shipment.

- Field Blanks--A field blank for soil sampling consists of pure silica sand placed in a container identical to those used for the actual samples. The field blank is transported to the site, opened at the site, and submitted with the samples for analysis. A field blank is used to eliminate false positives arising from contamination of samples from the atmosphere at the sampling site in addition to the uses cited for trip blanks.

- Equipment Blanks--An equipment blank for soil sampling consists of pure silica sand that is drawn through decontaminated sampling equipment and placed in a container identical to those used for the actual field samples. Equipment blanks are used to verify the adequacy decontamination procedures for sampling equipment in addition to the uses cited for field blanks.

Additional quality control checks will be performed by the analytical laboratories as follows.

- Matrix-Spiked and Matrix-Spiked Duplicate Samples--A known quantity of a representative analyte of interest is added to an aliquot (or a replicate) of an actual sample as a measure of recovery percentage. Spike compound selection, quantities, and concentrations will be described in the laboratory's analytical procedures.

- Quality Control Reference Samples--A quality control reference sample is prepared from an independent standard at a concentration other than that used for calibration, but within the calibration range. Reference samples provide an independent check on analytical technique and methodology.

The numbers and/or frequencies of quality control samples to be submitted and analyzed with each group of soil samples are specified in the soil sampling and analysis plan presented in Section 7.0 of the closure plan. The numbers of quality control samples proposed in the sampling plan have been determined based on guidance presented in SW-846 (EPA 1990).

Other requirements specific to calibration of laboratory analytical equipment are included in Section 6.0 of this plan. Detailed descriptions of internal quality control requirements for participating contractor or subcontractor laboratories will be provided in procurement documents or work orders in compliance with standard procedures noted in Section 7A.4.1.

7A.10 PERFORMANCE AND SYSTEM AUDITS

Performance, system, and program audits will begin early in the execution of this sampling plan and continue through completion of activities. Collectively, the audits will address quality affecting activities that include, but are not limited to, measurement accuracy; intramural and extramural analytical laboratory services; field activities; and data collection, processing, validation, and management.

Performance audits of the analytical accuracy of field screening instrumentation will be facilitated by performing internal quality control checks (i.e., testing reference and calibration standards) at regular intervals specified by procedure.

Internal quality control checks also will be performed to evaluate the analytical accuracy of the onsite mobile laboratory. In addition, the onsite mobile laboratory will be enrolled in and periodically evaluated by the Proficiency Environmental Testing program, administered by the Analytical Products Group, a subsidiary of Curtin Matheson Scientific, Inc. The Proficiency Environmental Testing program distributes standards (i.e., spiked samples) bimonthly to participating laboratories for analysis. Standards are provided for gas chromatograph analyses for volatile and semivolatile organics, x-ray fluorescence metals, and ions analyzed by ion chromatography. The Analytical Products Group collates and evaluates the results reported by the various laboratories. Subsequently, the quality assurance officer for each laboratory will receive a report of findings, including the true values of constituents in the standards, the individual laboratory's percent recovery, the means and standard deviations for all participating laboratories, and the individual laboratory's deviation from the mean for each standard. Participation in the Proficiency Environmental Testing program will be the primary performance audit tool for the onsite mobile screening laboratory operation.

Regarding offsite contractor laboratory analyses of confirmatory soil samples, performance audits of analytical accuracy will be implemented through the use of quality assurance and quality control samples. Confirmatory soil samples will be split in the field. The offsite contractor laboratory will receive one group of splits; the second group will be

analyzed in the onsite mobile laboratory. Field and equipment blanks will be included in both groups.

System audit requirements will be implemented in accordance with QI 10.4, "Surveillance" (WHC 1988b). Surveillances will be performed regularly throughout the course of sampling activities. Additional performance and system 'surveillances' might be scheduled as a consequence of corrective action requirements or might be performed on request. All quality affecting activities will be subject to surveillance.

Sampling plan activities could be evaluated as part of environmental restoration program-wide quality assurance audits under procedural requirements (WHC 1988b). Program audits will be conducted in accordance with QR 18.0, "Audits"; QI 18.1, "Audit Programming and Scheduling"; and QI 18.2, "Planning, Performing, Reporting, and Follow-up of Quality Audits". Program audits will be performed by qualified auditors in compliance with QI 2.5, "Qualification of Quality Assurance Program Audit Personnel" (WHC 1988b).

7A.11 PREVENTIVE MAINTENANCE

All measurement and testing equipment used in the field and the laboratory that directly affect the quality of analytical data will be subject to preventive maintenance measures that ensure minimization of measurement system downtime. Preventive maintenance instructions for field equipment will be as stipulated in approved operating procedures for the equipment. Laboratories will be responsible for performing or managing the maintenance of assigned analytical equipment. Maintenance requirements, spare parts lists, and preventive maintenance instructions will be included in individual laboratory procedures or in laboratory quality assurance plans, subject to review and approval. When samples are to be analyzed by a contractor or subcontractor laboratory, preventive maintenance requirements for laboratory analytical equipment will be as defined in the contractor laboratory's quality assurance plan(s).

7A.12 DATA ASSESSMENT

Analytical data will be compiled and summarized by the laboratory and forwarded to the sample management organization for validation as described in Section 7A.8.2 before the data can be used in any assessment activities. Assessments could include various statistical and probabilistic techniques to compare and/or analyze data. The statistical methodologies and assumptions that are to be used to evaluate data will be identified in written instructions that are to be signed, dated, and retained as project quality records in compliance with EII 1.6, "Records Management" (WHC 1988a) and QR 17.0, "Quality Assurance Records" (WHC 1988b). These instructions will be documented in the final report for each sampling and analysis project.

7A.13 CORRECTIVE ACTION

Corrective actions required as a result of surveillance reports, nonconformance reports, or audit activities will be documented and dispositioned as required by QR 16.0, "Corrective Action"; QI 16.1, "Trending/Trend Analysis"; and QI 16.2, "Corrective Action Reporting" (WHC 1988b). Primary responsibilities for corrective action resolution will be assigned to the Technical Lead and the quality assurance coordinator. Other needs for corrections to measurement systems, procedures, or plans that are identified as a result of routine review processes will be resolved as stipulated in applicable procedures or referred to the Technical Lead for resolution. Copies of all surveillance, nonconformance, audit, and corrective action documentation will be retained as project quality assurance records.

7A.14 QUALITY ASSURANCE REPORTS

As indicated in Sections 7A.10 and 7A.13, project activities will be assessed regularly by audit and surveillance processes. At the conclusion of a given sampling and analysis project, all related field and laboratory data, raw data, reports, surveillance reports, nonconformance reports, audit reports, and corrective action documentation will be transferred for archival to the Hanford Site Records Holding Area (if documentation has not been transmitted previously). In the event that original quality-affecting documents are to be retained and/or controlled by others, legible copies will be transmitted to the Records Holding Area for inclusion in the project record file.

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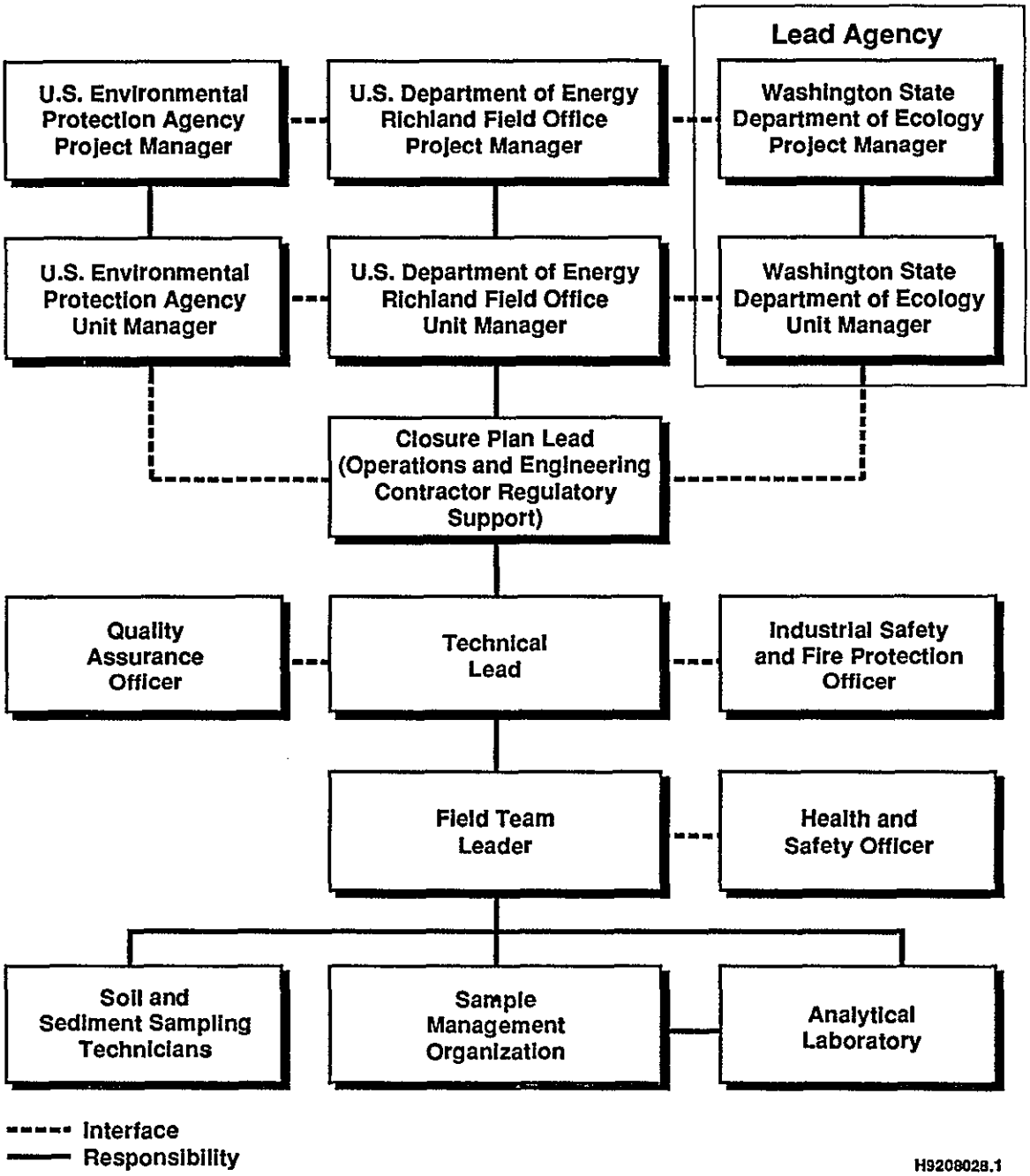

Figure 7A-1. Project Organization for Sampling and Analysis for 200 West Ash Pit Demolition Site Closure Area.

Table 7A-1. The 200 West Ash Pit Demolition Site Analytical Methods, Analytical Support Levels, and Target Practical Quantification Limit Values for Investigative Soil Sampling.

Analysis for Volatile Organics by Purge and Trap Followed by GC/MS (Analytical Level III):
Target Compound List (TCL) Analytes (PQL = 5 µg/kg): * Benzene * Toluene
Tentatively Identified Compound (TIC) Analytes (PQL = 100 µg/kg, except as noted): * Acrolein (poor purging analyte), (PQL = 1,000 µg/kg) * 1,2-Bis(2-chloroethoxy)ethane * Bromobenzene * 2-Butoxyethanol * Cyclohexane * Diisopropyl benzene * Dioxane (poor purging analyte) (PQL = 1,000 µg/kg) * Ethyl acetate * Ethyl ether * Heptane * Hexane * Isopropyl ether * Naphtha (petroleum naphtha) * Nitromethane * Tetrahydrofuran * Tetrahydronaphthalene
Analysis for Semivolatile Organics by Supercritical Fluid Extraction followed by GC/MS (Analytical Level III): Tentatively Identified Compound (TIC) Analytes (PQL = 3,300 µg/kg): * Phenyl ether * Picryl chloride
Aqueous Extraction Followed by Direct Aqueous Injection (Analytical Level III, PQL = 100 mg/kg): * Allyl alcohol (degradation product of allyl magnesium bromide) * n-Butyl alcohol (degradation product of butyllithium) * Ethylene glycol monoethyl ether * Methanol * p-Nitrobenzoic acid (degradation product of p-Nitrobenzoyl chloride) * Picric acid
Analysis for Metals by X-Ray Fluorescence (Analytical Level III, PQL = 10 mg/kg): * Chromium metal, powdered
Ions by Ion Chromatography (Analytical Level III, PQL = 100 mg/l): * Chloride * Sulfate * Sulfide
Ancillary Analyses (Analytical Level II, PQL N/A): * Soil pH

GC/MS = gas chromatograph/mass spectrometer.
TCL = target compound list.
TIC = tentatively identified compound.
PQL = practical quantification limit.
µg/kg = microgram per kilogram.
mg/kg = milligram per kilogram.
mg/L = milligram per liter.
N/A = not applicable.

APPENDIX 7B

TRAINING COURSE DESCRIPTIONS

APPENDIX 7B

This appendix contains a training matrix and brief course descriptions.

Environmental and Hazardous Material Safety Training Matrix.

Employee category	Course title (length/frequency)														
	Hazardous Communication and Waste Orientation (1 hour)	Generator Hazards Safety Training (4 hours)	Hazardous Materials Waste Job-Specific Training (length varies with each TSD unit)	Radiation Worker Training (8 hours)	Waste Site Basic (16 hours)	Scott SKA-PAK* Training (2 hours)	Cardiopulmonary Resuscitation (4 hours)	Fire Extinguisher Safety (1 hour)	Waste Site Advanced (24 hours)	Waste Site Field Experience (24 hours)	Hazardous Waste Shipment Certification (24 hours)	Certification of Hazardous Material Shipments (8 hours)	Hazardous Waste Site Supervisor/Manager (8 hours)	Compliance Category**	Total hours
1. All employees	X														1
2. General worker		X	X											1	5 + unit-specific training
3. General supervisor/manager		X	X											1	5 + unit-specific training
4. General nonradiological shipper		X	X								X			1,2	29 + unit-specific training
5. General hazardous material shipper		X	X									X		1,2	13 + unit-specific training
6a. Hazardous waste worker (known hazards)		X	X	X	X									1,3	28 + unit-specific training + field experience
6b. Hazardous waste worker (unknown hazards)		X	X	X		X	X	X	X	X				1,4	44 + unit-specific training + field experience
7. Hazardous waste supervisor/manager		X	X	X		X	X	X	X	X			X	1,5	52 + unit-specific training + field experience
8. Hazardous waste shipper		X	X	X		X	X	X	X	X	X	X		1,2,4	76 + unit-specific training + field experience

* Scott SKA-PAK is a trademark of Figgie International, Incorporated.
** Compliance categories:
1 WAC 173-303, 29 CFR 1910.1200
2 49 CFR 173
3 29 CFR 1910.120 (24-hour requirement)
4 29 CFR 1910.120 (40-hour requirement)
5 29 CFR 1910.120 (40-hour plus 8-hour requirement).

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ENVIRONMENTAL AND HAZARDOUS MATERIAL SAFETY TRAINING		
	Course name	Description
1.	Hazard Communication and Waste Orientation	Course provides an overview of the federal and applicable hazard communication programs and hazardous and/or dangerous waste disposal programs.
2.	Generator Hazards Safety Training	Course provides the hazardous and/or dangerous material/waste worker with the fundamentals for use and disposal of hazardous and/or dangerous materials.
3.	Hazardous Materials/Waste Job-Specific Training	Course provides specific information on hazardous and/or dangerous chemicals and waste management at the employees' TSD unit.
4.	Initial Radiation Worker Training	Course provides radiation workers with the fundamentals of radiation protection and the proper procedures for maintaining exposures ALARA.
5.	Waste Site Basics	Course provides required information for the safe operation of hazardous and/or dangerous waste TSD units regulated under 40 CFR 264 and 265 pursuant to RCRA and WAC 173-303.
6.	Scott 'SKA-PAK'[1] Training-SKA	Course instructs employees in the proper use of the Scott 'SKA-PAK' for entry, exit, or work in conditions 'immediately dangerous to life and health' and instructs employees to recognize and handle emergencies.
7.	Cardiopulmonary Resuscitation	Course of the American Heart Association that provides certification in cardiopulmonary resuscitation for the single rescuer (Heartsaver Course).

[1]Scott SKA-PAK is a trademark of Figgie International, Incorporated.

	Course name	Description
8.	Fire Extinguisher Safety	Course provides videocassette presentation that covers types of portable fire extinguishers and the proper usage for each.
9.	Waste Site-Advanced	Course provides environmental safety information for RCRA and/or CERCLA operations and sites. Topics include regulations and acronyms, occupational health and safety, chemical hazard information, toxicology, personal protective equipment and respirators, site safety, decontamination, and chemical monitoring instrumentation.
10.	Waste Site Field Experience	Course is a 3-day field experience under the direct supervision of a trained, experienced supervisor.
11.	Hazardous Waste Shipment Certification	Course provides an indepth look at federal, state, and Hanford Site requirements for nonradioactive hazardous and/or dangerous waste management and transportation.
12.	Certification of Hazardous Material Shipments	Course provides training in dangerous material regulation of the U.S. Department of Transportation, as required by law, to those who certify the compliance of Hanford Site hazardous and/or dangerous material shipments. The main focus is on the proper preparation and release of radioactive material shipments.
13.	Hazardous Waste Site Supervisor/Manager	Course provides specialized training to operations and site management in the following programs: safety and health, employee training, personal protective equipment, spill containment, and health hazard monitoring procedures and techniques.

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